

ROCKS and MINERALS

PUBLISHED
MONTHLY



Edited and Published by
PETER ZODAC

AUGUST
1948

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Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879

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Specially written articles (as contributions) are desired.

Subscription price \$3.00 a year; Current numbers, 35c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit direct to the Publisher.

Issued on the 25th day of each month.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

ROCKS and MINERALS

PEEKSKILL, N. Y., U. S. A.

The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

Coming Events

Mineralogical Club of Hartford

OUTINGS FOR 1948

August 29—Tilly Foster Iron Mines, Tilly Foster, N. Y.

Sept. 12—Upper Merryall Quarry

Sept. 26—Chester, Mass.

Blanford, Mass.

Oct. 10—Roxbury, Conn.

Oct. 24—Lincoln, R. I.

Nov. 14—Open Date

Meeting Place—249 High Street, Hartford, Conn.

Time 9:00 A.M., on the dot.

Anyone needing transportation or can take some one, please call one of the following committee:

	Telephone No.
George P. Robinson	Hartford, 7-9670
Arthur T. Safford	Hartford, 3-0341
Robt. Brandenburger	Hartford, 5-3365
George Dunbar	Hartford, 54-4887

Pictorial Story about Dr. Frederick H. Pough

In the May-June, 1948, issue of *Real Fact Comics* appears an intensely interesting pictorial story about Dr. Frederick H. Pough of New York City. The story takes up six pages and covers some of the highlights of Dr. Pough's career as a gem and mineral specialist.

Dr. Pough, one of the world's greatest gemologists and mineralogists, is frequently consulted by scientists, jewelers, and even police as the pictorial story brings out. He has traveled widely, studying mineral occurrences in many foreign countries. He is the author of a large number of papers on his favorite subjects and is a member of many societies, including Rocks and Minerals Association.

Dr. Pough is Curator of Gems and Minerals at the American Museum of Natural History in New York City.

Real Fact Comics is published bi-monthly by National Comics Publications, Inc., 480 Lexington Ave., New York, 17, N. Y.

International Geological Congress 18th Session—Great Britain, 1948

Aug. 25-Sept. 1, 1948

(A. J. Butler, Gen. Sec., Geological Survey and Museum, Exhibition Road, London, S. W. 7, England)

Some 1,100 geologists from countries overseas plus British geologists will swell the attendance to over 2,000. Twenty-eight Governments and about 160 universities and scientific institutions will be represented at this, the world's greatest geological congress which meets every two years and each time in a different country. Field trips in many geological and mineralogical localities are on the program.

Northwest Federation Convention

Sept. 4-5, 1948

Bozeman, Mont.

(H. E. Murdock, Vice-President, Bozeman, Mont.)

Rocks and Minerals to Come Out Bi-Monthly

Beginning with the September issue (our 22nd anniversary number), *Rocks and Minerals* will come out every other month, due to the present unsettled conditions in the printing industry. Once conditions become normal, the magazine will revert back to a monthly.

A number of letters praising our decision have been received. A typical letter is printed below.

"I note in the July number that you are planning to issue *Rocks and Minerals* only every other month. Sure do hate that, as I look forward to reading it (both articles and ads) every month. However, if it will help solve your printing difficulties, so be it, but hope that it will not be too long in becoming a monthly publication again."

Woodland G. Shockley,
Vicksburg, Miss.

Aug. 1, 1948

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RAMBLES IN A COLLECTOR'S PARADISE

Part 3

By HORACE W. SLOCUM

320 Charlotte Ave., Rock Hill, S. C.

GOVERNEUR AND HAILESBORO THE TINKLE OF A GHOSTY HAMMER

Tho all my headquarters when, "up there," was Gouverneur, I never did much collecting nearby. True, my map is covered with red rings penciled at the places I wanted to see. But time was always limited so my collecting around the places near Gouverneur will have to wait. Some day when you are in the quarry which Valiant says, "Is directly west of the Gouverneur depot, perhaps a good pistol shot away," you may hear the ring of a hammer on nearby ledges. It will surprise you to look around and see no one there. Be neither surprised nor frightened, Friend. Just shrug your shoulders and say to yourself, "Well he said he'd come back and I guess his Spirit is here right now." Then sit down and light a cigarette, for I always like to squat and smoke and chat with a fellow collector when I meet him in the field.

The two prospects that I made near Gouverneur, however, produced in one case a nice specimen of garnet, and in the other the almost certainty that I had found one of Valiant's locations.

First the garnet mine just on the outskirts of Gouverneur. If you will look up Miss Corbin who ran an overnite guest house about 3 blocks up Main St., she can tell you right where the mine is located. My map gives it about a mile north of town on the left hand side of the road to Peabody Bridge. It is right beside the road and easy to find. Small garnets the size of a pea are scattered thru the quartz ledges. The mine dump contains much fine massive garnet, tho the material is grainy. I would have taken a number of specimens from here except for the following disturbing incident: I

was sitting idly on the dump pile, which is not large, slowly turning over piece after piece. Wool gathering you might call it. For some reason I happened to glance down at the pile of rocks which I had uncovered to discover in amazement and no small horror that I had unearthed the top of a wasp's nest!!! The place was simply crawling with them! Grabbing the nearest specimen of garnet in one hand and the hammer in the other, I made the car in three bounces. Wasps, I discovered, are sometimes slow to get into the air. But when one does light and give you the works; Brother, you think you've been shot, and frequently wish you had been, and it was all over.

The locality near Hailesboro of which Valiant spoke, or rather one of them, for he named many, to the confusion of all who came after, was a yellow tourmaline location.

Mr. Valiant—quote.

"Yellow tourmaline rare" says Dana. About $1\frac{1}{2}$ or 2 miles east of the depot (Gouverneur depot) on the road running parallel with, and on the north side of the river, we found an apple orchard. Between the trees were masses of grey rocks sticking out of the ground, but *in situ*. This limestone had been dissolved away leaving various minerals in relief or *loose in the soil*. Quite abundant was a light yellow glassy mineral but not in fine crystals. These were yellow tourmalines, not rare in this place. We never found them elsewhere." End quote Valiant. (*The Mineral Collector*, March, 1899, p. 3.)

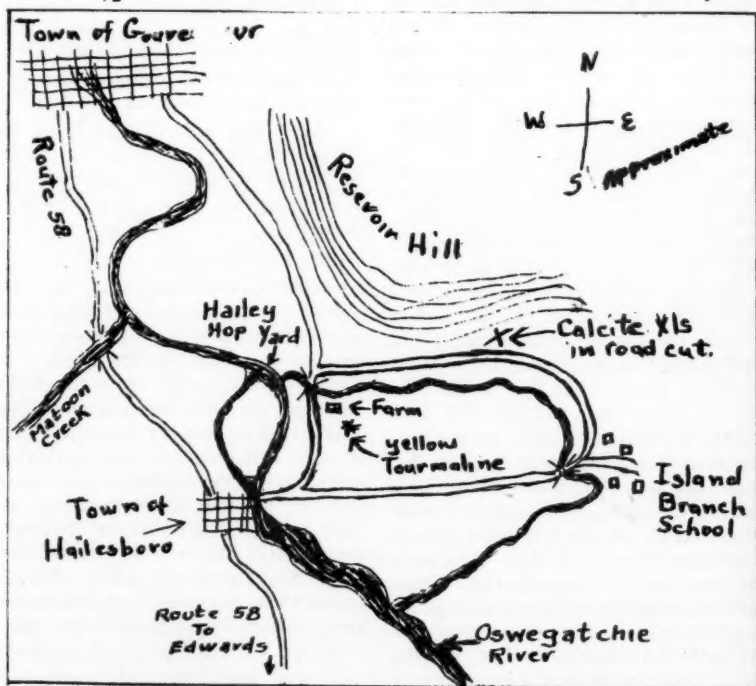
If you are a married man, who is crank enough to hunt minerals in a pair of white flannel pants, who has a wife

not too interested in minerals, my Friend, you have a cross to bear. So when I blossomed out on a warm Sunday morning in May in white trousers and shoes I could just picture my wife's reaction. "No mineral hunting to-day, thank Heaven. We'll just go for a nice long ride. No waiting at the side of a dusty road, being pestered with flies and mosquitoes while he pecks around in the woods for some old rocks. Not when he has on those white britches." Thus Mrs. S. mental processes that fine May morning. Ha! Little did she know! Enlightenment came quickly if not painlessly.

Take route 58 from Gouverneur to Hailesboro, just for a nice ride. Pass by several talc mines and dumps, because there's not so much there of interest anyway. Come into Hailesboro and turn left across the Oswegatchie River. Across the river about $\frac{1}{2}$ mile the road makes a

Y. The right fork goes to Island Branch School. The left fork, which is the one you want to follow, bears further left and follows the river. In another $\frac{1}{2}$ or $\frac{3}{4}$ mile it will cross a branch of the river coming in from the right. Just before you cross the branch a farmhouse sitting at the base of a steep hill will be seen on your right. Behind this house and slightly to the left of it, high on the brow of the hill, bare weather-worn ledges of limestone will be found protruding from the soil. On the worn surfaces of these ledges nodules or bunches stand out in high relief. These nodules when broken open contain an orange colored glassy mineral. Tourmaline? I believe so. Not very good specimens but according to Valiant the best there is in this part of the country. No I didn't do any digging here. Remember those white pants?

I had hunted for the above place be-



Valiant's yellow tourmaline locality Hailesboro, N. Y. (Not to scale).

fore. But made the mistake of thinking it on the hill on the other side of the branch. Reservoir Hill it is called on the topographical map. All I found here were great monoliths of syenite and one vein of calcite beside the road. Some good crystals of calcite sprinkled with pyrite were collected at this road cut; tho as I was searching for yellow tourmaline of course I wasn't so interested in the calcite specimens.

Valiant speaks of a number of places around Gouverneur and Hailesboro. But I never had time to find them. Not yet at least. So if you are ever on the brow of that hill overlooking Hailes Hop Yard and the Oswegatchie, the one where the yellow tourmaline is found, listen closely, Brother, you may hear the tinkle of my hammer. For if I may not go back in these three score and ten—well there's the rest of Eternity—if I can get a Special Dispensation. So I shall be there, somehow, breaking open those yellow tourmaline nodules. I'm sorely afraid, however, the white britches will have been exchanged for a pair of wings—white ones I hope.

SKIPPING ABOUT—SOME MINOR PLACES

Any one who visits St. Lawrence Co., N. Y., after minerals will, of course, want to collect some hexagonite. So much has been written on this locality it would seem hardly necessary, even if possible, to add more. The mine is on the left hand side of route 58 from Gouverneur to Edwards. A fairly large mine dump. There were the remains of some of the old buildings when I was there. It is seen just before entering Fowler, N. Y. Any one interested in pseudomorphs will find talc after several minerals in this dump. The hexagonite, which is of a light pink to lavender in color, is so much harder than the talc that it cannot be mistaken.

At Fowler, if you take the right hand road toward Sylvia Lake, you will pass several large talc mines. The talc to me is not very interesting and at my visit no accessory minerals were noticed in the dumps. Still here is a chance to see one of the large mines in operation. These mines and the wages paid by them are a large part of Gouverneur's life blood.

From Fowler on to Edwards is a pleasant ride. Approaching Edwards the mine



The hexagonite dump at Fowler, N. Y.

buildings, dumps and head shafts of the Edwards Zinc mine, become visible on the left. A visit to this mine to me was disappointing. I was doubtful in the first place whether or not they'd let me on the property. Some had been admitted, some had not. They were very courteous, however, made me sign an accident release and turned me loose on the huge never ending dumps. Unfortunately I must relate that the dumps consisted of quartz, var. milky, massive; talc, soft and powdery; pyrite and sphalerite, both uncrystallized; some oil green serpentine which I collected and some tiny brown crystals which I believe to be garnet or tourmaline. Blue apatite crystals have been found here, but none fell to my lot. So snapping a few pictures I made tracks for better locations.

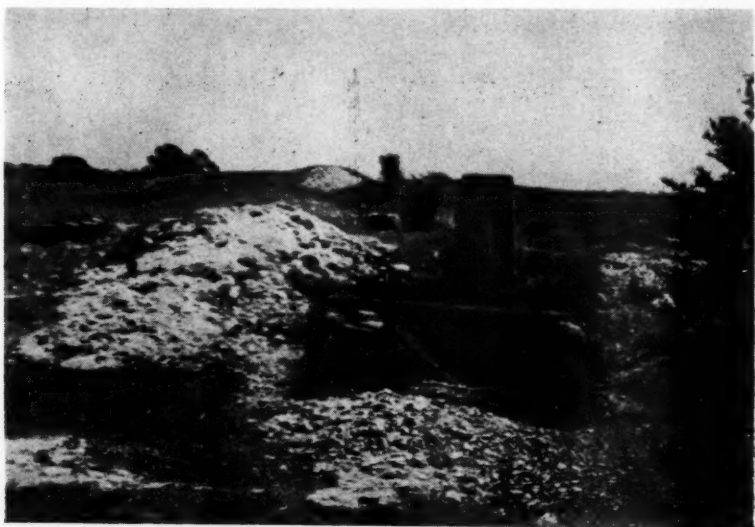
Dahlburg says in his note #11 that the location of Mineral Point is uncertain. If you will notice on the Hammond quadrangle, there is on the western shore of Black Lake a place called Rollway Bay. Southwest of the word, Rollway, the land juts out into the lake in a long flat peninsula. The map shows this peninsula

to be an 800 foot elevation separated from the main land by a marsh. A little more than half way southwest on the main land side of this hill were the mines of Mineral Point. I have this information from "old settlers" in Popes Mills, who should know. I have visited the mines. There is nothing there now but small dump piles, very much overgrown. A few flecks of galena may be collected, also fair sized cleavages of calcite. You are advised not to waste your time here. The mines on the islands in Black Lake are not worth visiting either. One of them, tho, a shaft sunk not 15 feet from the shore, is a curiosity.

Valiant can make your mouth water when he tells about what he found at the Macomb lead mines. Listen:

Mr. Valiant—quote.

"This cleft had been filled with calcite, not snow white like the other but clear and colorless in the center and topaz yellow, amethyst and rose colored near the walls.— The vein was more or less open in the middle showing crystals as large as Webster's dictionary; some of them showing phantoms; red, yellow



All that is left of one of the large lead mines near Macomb, N. Y.

or violet inside of the colorless outer crystals." End quote. (*The Mineral Collector*, April, 1899, p. 31.)

I'll not antagonize you with Valiant's description of the purple and red fluorite cubes found at these mines. But I shall have to inform you that at the mine we visited no sign of the fluorite was visible and of the calcite crystals nothing to be found; but a few small cleavages of white calcite and a few equally small pieces of galena is all to be found today. Now it is barely possible that we did not find the right mines. If you will look at the Hammond quadrangle map you will notice that the road running thru Macomb toward the southwest forks about $\frac{1}{2}$ mile from the village. About $\frac{1}{2}$ mile down the eastern fork a dotted line representing an old road branches left and runs to the northeast. Around the junction of these two roads and at the end of the old road lies what is left of these old lead mines. We did not visit them all. But were told that the one at end of the road was the largest and so tramped along until we came to it. Our bags, however, were as empty on the way out as they were when we went in. You are

well advised to save yourself this trip. Apropos of the colored calcite crystals,—I purchased from a high school lad in Gouverneur, a translucent rhomb of calcite of a light amethyst color. It measures 6" x 4" x 2". But I never could find out where it came from. He said, "Rossie", but I cannot believe this story. From the look of it (material you seldom see today) I have decided it came from the Macomb lead mines long long ago. Was, perhaps, given to the lad. He was very reticent about naming the mine from whence it was supposed to come.

On the New York Museum's Geologic map of the Hammond quadrangle, if you will draw a line from the R in Hickory Lake to the junction of the 25' line where it intersects the right hand border of the map, you will find it passes thru a small black square. This is a sunstone locality. Like Dahlburg, I could not find it. Searching in this roughly wooded region which is a series of ridges, one just like the other, took a whole afternoon. No pits were found. I did uncover a ledge containing fair specimens of brown tourmaline; but could give no directions for



We found brown tourmaline here in the wilderness.

finding them in this wilderness.

I visited only one iron mine. The Sterling. It is easy to find. Follow route 11 from Antwerp toward Gouverneur for $2\frac{1}{2}$ to 3 miles. Enquire hereabout for the mine. The road into the mine should not be attempted in a car. There is one bad mud hole in, it and the road bed is badly washed out. Only $\frac{1}{4}$ mile to walk anyway. If you have a topographical map of the Antwerp, N. Y., quadrangle, notice the spur railroad line running northeast from the town to a group of houses. This was the mine village and the old road represented by dotted lines is shown on this map. The minerals here are not spectacular. Massive hematite which, when broken open, may disclose small cavities lined with very small velvety black hematite crystals. A few brassy colored specks and wires of millerite are also found in these cavities. What intrigued me most are the tiny quartz crystals which run with these ores. Formerly large crystals were found. But nowadays these are not in evidence. The crystals are what Valiant calls "Quartz Dodecs". They are shaped like Fig. 722 in Dana's Text Book. What few I found were in cavities and no more than $\frac{1}{8}$ " in diameter, but so unusual in shape that I prize them highly. According to Valiant this type of crystal is usual in these New York ores. How, I would have liked to have had time to prospect the other mines for them. Do you listen for my hammer here, too, in days to come. For it is one of the places I shall haunt—in Summer.

Did you ever have a place that you've hunted, asked questions about and prospected for, thru woods, briers and swamps? Keep hunting—I hunted off and on for two years a vesuvianite locality in New Hampshire. Finally found it. But I never found that fabulous road bed of O. K. Smith's near Gouverneur. Listen to Mr. Valiant—quote.

"Apropos of impurities Mr. O. K. Smith (and he was O. K.) owned a large lime kiln near Gouverneur. Near his limestone quarry was an immense pile of graphite; his "bugbear" The road from this quarry to the kiln needed ballast,

but the graphite did not make a good for he had tried it. The last time we saw this road it was ballasted with green fluorite!!!—Mr. Smith lived in a large marble mansion built from his own quarry.—He owned a red granite quarry near by. End quote—Valiant. (*The Mineral Collector*, March, 1899, p. 4.)

Now do you hunt up some one who knows about O. K. Smith and his large marble mansion and find that road bed. I spent enough time on it, and talked with a lot of people; but no one knew the right Smith. So I never discovered the green fluorite road, much to my sorrow. Nor did I ever discover the "Foxes Paradise," that Valiant tells about; tho I still suspect it is near Natural Dam where the "Paint Mills," were.

I agree that this is all the skipping around we should do. Excepting the hexagonite locality none of the places are exceptional, so if your time is short waste it not upon them. For we shall ramble again shortly, or long windedly, to better fields of endeavor.

(To be continued)

Eyles Meets with An Accident!

Wildfred C. Eyles, of Bayfield, Colo., one of the West's most popular Rockhounds, recently was in an accident which prevented him from attending the big convention at Long Beach, Calif., (July 16-18). A letter to the editor of *Rocks and Minerals* reads as follows:

Dear Friend Zoda:

Well we missed out on the show at Long Beach which I knew was going to be a whale of an affair, for at least they had a place large enough to accommodate the huge crowds.

Just as we were arranging things and had our spare reserved for the convention, we upset the car and I got a badly gashed leg. Been in the Mercy Hospital, in Durango, Colo., for a month but expect to be out this week and—up and at them.

Received some nice wires and flowers from the convention, for a lot of the boys had been informed that I had taken the count, which thus explained my absence.

July 20, 1948

Wilfred C. Eyles,
Durango, Colo.

MINAS GERAES AND ITS GEM MINERALS

By KILIAN E. BENSUSAN, R.S.M.

8815 Columbus Ave., San Fernando, California

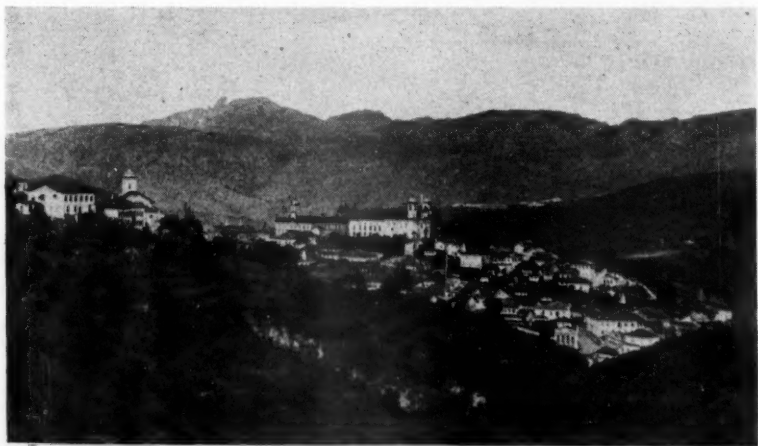
Brazil, which is larger than the United States, consists of 22 states, a territory and a federal district, most of which are rich in minerals. Yet the average mineral hobbyist abroad has heard of hardly more than one Brazilian state—Minas Geraes. Why is this? The answer lies in history.

From the time of Brazil's discovery by a Portuguese navigator in 1500, the Portuguese had great hopes of discovering gold and precious stones in this new colony. But their search along the coast being without success, they turned to agriculture. It was not until 1570 that they got their first clue to the whereabouts of mineral riches, through the arrival at the coast of some Indians who had some "colored stones" in their canoe for trading purposes. These natives, it was found, had journeyed down a river system from the region beyond the coastal ranges, the country of the Cataguaz Indians. The stones were green beryls, or emeralds.

Following the riverine trails, prospecting parties began to probe the Cataguaz country, but 103 years passed before they

brought back positive evidence of mineral finds, in the form of beryls, crystals, sapphires, and gold. Soon after, another expedition, following the same route as the first successful group, returned with similar minerals, plus tourmalines. By that time the prospectors had begun to put their reports into writing and to map their routes and landmarks of the "Inner Forest," that is, the timberlands lying beyond the forests of the coast range.

One of these landmarks was a curiously horned mountain which the Indians called Itacolomi, "the rock (ita) with the little one" (colomi), or, as one might say, the squaw-rock with papoose. It rises near the headwaters of the Rio Doce, an important stream, the course of which scouts used to follow from the coast. Near Mt. Itacolomi, in 1698, gold was discovered in such abundance that the further quest for precious stones was almost forgotten. The site became known as Villa Rica (Richtown) and was the center of gold rushes which in a few years swelled the population to 80,000. Thirty years later diamond fields were



Mt. Itacolomi (source of itacolomite) overlooking the colonial city of Ouro Preto, Minas Geraes, Brazil.

located a little to the northwest of Villa Rica, at Tejuco. A diamond rush ensued. Other minerals were noted, and the Cataguaz Country became known as the region of general mining or Minas Geraes (Meê nus Je ris). Villa Rica became Ouro Preto (Black Gold) because the local gold was enriched with palladium, increasing its value about 10% and darkening its hue. Tejuco became Diamantina.

So, from the very beginning of Brazil's mining history, attention became focused upon the area that was, under later political organization, to be known as the State of Minas Geraes. It was the earliest Brazilian interior region to be explored, opened up, and settled. Since colonial times Ouro Preto has been regarded as the mineral capital of Brazil. Geologically that district is estimated to be 557 million years old. In the hundred years following its discovery, the area yielded 524 tons of gold. This treasure supported the entire colony of Brazil as well as the mother country, Portugal, in the capital of which the name of Ouro Preto was, in those days, as familiar as that of Rio de Janeiro. Thus Minas

Geraes became synonymous with mineral wealth from earliest colonial times, a position which it has maintained without difficulty to the present day, even though mines have opened in other states.

With the advent of the twentieth century the state government moved from Ouro Preto, which occupied seven steep hills girt by loftier ranges, to the newly built city of Belo Horizonte (Beautiful Horizon), where there was more scope for modern expansion. Now 260 years old, Ouro Preto has been created a National Monument. It is like an enchanted place, wrapped in the golden dreams of its fabulous past.

Most striking token of Ouro Preto's antiquity are the fifteen churches gracing every vantage point, ornate with carvings of the local steatite and with gold leaf. Thus the colonial miners sought to use up their gold locally, to evade export taxes. What was exported was weighed in the ponderous old Mint House, one eighth going to the Portuguese Crown. Another relic of the old days is the former summer palace of Brazil's Emperor, now the Ouro Preto School of Mines, where there is a fine collection of Brazil-



The Ouro Preto School of Mines, formerly the summer palace of the Emperor of Brazil, at Ouro Preto, Minas Geraes, Brazil. It houses a fine collection of Brazilian minerals.

ian minerals. Interested persons may see it upon application to the Director. Here it is opportune to mention that in Belo Horizonte, a few hours' journey away, a place certain to be in the itinerary of visitors to Minas Geraes, there is a mineral exhibition actually open to the public every day. It is in the Feira de Amostras, (The Samples Fair), a building at one end of the main street, housing exhibits of state products.

During the twenty-one years that my father was general manager of the Ouro Preto Gold Mines, Ltd., that place was my home. From the age of six I have been familiar with the district, there acquiring the practical foundation of my mining training. In the twenty-odd years elapsed since then, I have returned to Minas Geraes for many intervals, during which I made extensive surveys of the working and abandoned mines and the mineral reserves of the state. In those more than forty years of association with mining in Brazil, I was in a very advantageous position to acquire interesting specimens, and it was during that time that I made my personal collection. Since I came to live in California three years ago, a great many mineral hobbyists from all over the country have called to see it, and frequently ask what be their chances of collecting minerals in Minas Geraes.

Entrance of the U.S.A. and Brazil in World War II have brought about changes affecting minerals for collections and lapidary work. Up to that time there was very little outlet in Brazil for specimens and no great demand for gem materials. Mineral collectors were and still are rare among Brazilians. Lapidaries are professionals, not hobbyists. There are, in short, no "rock hounds". Little account was taken of any but the most striking specimens, usually crystal forms, which as a rule were presented to the mine manager to garnish his desk. Government geologists and mineralogists placed their findings in the collection of the Department of Mines, or in the museums.

Except for the diamond mines, there has been no actual gem mining in Minas Geraes for many years. The topaz mines near Ouro Preto shut down about 25 years ago. Gem stones are found incidental to washing for gold or diamonds, extracting mica from the kaolinized pegmatites, and other mining operations. Formerly if a "miner",—generally a free lance gold-panner—happened to find gem stones, he realized whatever he could for them, usually in trade, at the nearest country store. These vendors traded them with suppliers, or sold them to lapidaries touring outlying districts in



A wayside inn and store in a remote village in Minas Geraes, Brazil. The miner or prospector brings gem stones to trade at these "vendas" for needed merchandise.

search of bargains in gem materials. Eventually the stones found their way to the lapidary shops in the larger towns, even to Belo Horizonte and thence to Rio de Janeiro, a neat profit marking each change of hands.

The Code of Mines forbade the export of semi-precious material in the rough, except in sample lots, or under special licence, to museums and bonafide private collectors. In practice, however, the latter was very difficult to carry out successfully.

With World War II, the United States sent thousands of her nationals to Brazil to work for the American Embassy, the War Shipping Administration, the Board of Economic Warfare, and other federal agencies. North American mining engineers and geologists penetrated all parts of the interior of Minas Geraes in the promotion and development of strategic mineral projects. There was scarcely a native Brazilian in any part of the backwoods who did not come into contact with these visitors from America, the land where mineral collecting and amateur gem cutting is a wide spread hobby. Many of these Americans created an unprecedented demand for mineral specimens and rough gems in Brazil, and still others, including members of the U. S. armed forces stationed at Brazilian bases, created an abnormal market for cut stones. Prices went up and up, from demand and readiness to pay more. This was the case not merely in the cities but even in the remote mining backlands, where the original finder selling direct to American engineers was handsomely remunerated.

But any incentive to increase the supply was offset by the fact that Brazilian miners and prospectors now had less time and liberty to look for specimens. More and more of them were drawn into employment in the war emergency mining projects. Thus, by the end of the war, minerals for collectors and lapidary work remained at a premium in Brazil, and so it goes to this day. It is more profitable and less troublesome for Brazilians to sell their minerals right on the

spot than to export them, prices now being higher in that country than present quotations in the U. S. for Brazilian stocks on hand.

Any rock-hound able and willing to pay the prices can have an enjoyable time collecting in Minas Geraes today. Present inflation makes traveling in Brazil far more expensive than it used to be, too. Buying specimens is the easiest and quickest way for the visitor to get them, especially if he has no strong contacts with mining people there, and scant acquaintance with the Portuguese language. A buyer is always welcome and sought after, requires no letters of introduction, needs ask no favors or make any excuses, as might be the case in attempting to do any rock or gem hunting near mines or regular fluvial washings. But the strongest deterrent to picnic field trips in Minas Geraes is not the generally good-humored democratic Brazilian miner, but the myriads of blood-sucking, fever-carrying ticks, or "carrapatos", that await on every blade of grass or twig to attach themselves to the first passerby.

Belo Horizonte, a city of over a hundred thousand population, with good hotels, is itself a center where specimens can be obtained, mostly by visiting the lapidary shops where surplus supplies are willingly sold. It is also the spring board to all points, near and far, of particular interest to mineral collectors. Ouro Preto is a few hours ride by train or taxi, and a good, new hotel awaits one. There the specialty is Imperial topaz, golden, and sometimes of rose or wine color. The rare gem, euclase, found near Ouro Preto, is sometimes offered, as well as almost any kind of gem stone, including amethyst, there being huge manganese deposits in the neighborhood. Specimens of practically any kind of mineral come from around Ouro Preto, including the flexible sandstone, Itacolomite, from Mt. Itacolomi, overlooking the city. (Brazilians prefer the original spelling to Itacolumite.)

By rail to the north of Belo Horizonte is Diamantina, center for diamonds and their alluvial satellites, the corundum family, zircons, and water-worn blue and colorless topazes, as well as rock crystal and all other types of quartz. Thence, another still more rural train journey takes one to the northern outpost of Montes Claros, end of the railway and jumping-off place to various gem areas in the Grao (Grand) Mogul Range, including the old aquamarine workings at Fortaleza. Any further journeys are by occasional bus or taxi over dirt roads, and accommodations are strictly rustic.

Also from Belo Horizonte a pretty good dirt road and a railway take one east through Santa Barbara, the locality for phenacite, and on to Itabira, the hematite center, where good beryls and garnets are obtainable. Thence to Figueira on the Rio Doce, mica headquarters, to which the pegmatite gems found incidental to mica mining are brought from all the surrounding area. Here you can get all the beryls, including morganite and chrysoberyl, tourmalines, garnets, kunzite,

hiddenite, and andalusite. A semi-weekly bus takes 13 hours to reach Teofilo Otoni, noted for green tourmalines. The watermelon tourmalines, rubellite, indicolite, citrine, rose quartz, topazes, and beryls from other less accessible villages to the north also find their way to Teofilo Otoni and Figueira. At the latter trading center brazilianite, found at Conselheiro Pena, a few hours east, is sometimes offered. Occasionally one can get a bottle full of gem pebbles of all kinds, representing the washing from a pot-hole in one of Minas Geraes' treasure-bearing rivers, on which these towns are invariably situated.

Arriving at one of these communities in quest of gems, all that is necessary is a word to the inn-keeper. He sets the "grapevines" in motion without more ado, and soon the vendors of stones will call. All this can be done at greater ease in Belo Horizonte or Rio de Janeiro, but to the mineral collector of pioneering instincts, adventures in the hinterland will make purchased specimens mean almost as much to him as if he had dug them "from the living rock".



Brazilian prospectors panning for gold in the Rio das Velhas, Minas Geraes, Brazil. Gemstones are found incidental to this work in which thousands engage as "free lancers".

BAUSCH & LOMB DEVELOPS SPECTROGRAPHIC ACCESSORIES

ROCHESTER, N. Y.—Development of five new accessories for use in spectrographic analysis was announced last month by Charles C. Nitchie, manager of the analytical division of Bausch & Lomb Optical Company.

Designed by John W. Forrest, head of the firm's spectrographic design section, and his staff, the accessories include a densitometer, a spectrum plate projector, a safety arc and spark stand, an electrode shaper and a briquetting press, all of which may be used with any spectrograph, regardless of make or design.

The densitometer permits direct reading and/or continuous recording of the density of the lines in an analytical spectrum, for determining quantitatively any element present in the specimen.

Operated by a control panel, the instrument projects the lines to be measured onto a miniature screen. Each line is individually centered over an adjustable slit, and the light passing through the line reaches a photo-electric cell directly behind the screen. Current generated in the cell is then amplified and transmitted to a highly sensitive micro-ammeter scale for direct reading. An integral part of the instrument is an electric motor which permits easy conversion to a continuous recorder simply by attaching a commercial recorder.

Outwardly resembling a puppet theater, the spectrum plate projector aids identification of unknown elements in any specific material or specimen. A special mirror arrangement throws the spectral image on a screen built into the projector, or onto a wall screen when greater magnification is desired for observation by a group.

The spectrum of the specimen being analyzed may, in either instance, be easily compared with a known spectrum to determine alien elements present. The instrument's built-in screen is also adjustable to provide desired changes in magnification.

To insure complete protection in using

the dangerously high voltages (two to 10 amperes at 110 to 15,000 volts) needed to burn the specimen in the arc for spectrographic analysis, the optical firm also developed a safety arc and spark stand. The "live" parts of the circuit are encased in a cylindrical chamber. Thoroughly insulated, the chamber is inaccessible from the outside, except by means of a door, opening of which automatically breaks the electric circuit.

The stand is equipped with a unique screening device that is capable of isolating that portion of the arc that is of particular value in analyzing the specimen.

Resembling a miniature lathe, the electrode shaper has a rotatable turret equipped with adjustable cutters, drills and tools for shaping graphite rods into the various standard electrodes used as arc and spark excitation sources. It is the first instrument of its kind on which different types may be made without disassembling and reassembling the instrument.

The briquetting press, which looks not unlike an old-fashioned coffee-grinder in modern dress, compresses powdered drugs, chemicals, minerals, plant ashes, drill chips, hacksaw dust, and the like, into pellets about the size of an aspirin tablet. The pellets can then be easily introduced into the graphite rods prepared on the electrode shaper for burning in the arc and spark stand. Operated manually, little effort is required to produce pressures up to 16,000 pounds to compress the material into pellets.

Importance of the new Bausch & Lomb spectrographic accessories may be measured in terms of the importance of spectrographic analysis. Although more popularly associated with the analysis of mineral, chemical and industrial materials, spectroscopy is becoming increasingly valuable in everyday life for the study of public health problems, scientific crime detection, blood pathology, assaying vitamins and analyzing drinking water.

RADIOACTIVE MINERALS, THEIR SOURCE AND THEIR DISTRIBUTION

By GEORGE HEILBORN, B.S.

The explosion of the atomic bomb on Hiroshima has ushered in a new era of power, equal to the discovery of electricity and the invention of the steam engine. It is the attempt of this paper to give a brief survey of those minerals which constitute the sources of uranium, used for the making of the atomic bomb and for atomic energy, and also to cite their geographic and geologic locations throughout the world.

The yellow oxide, (oxide) of Uranium was extracted from the mineral pitchblende in 1789 by Klaproth and was named uranium after the then newly discovered planet Uranus. Several investigators had believed they had isolated the metal from the oxide, but it was not until 1840 that Peligot accomplished this feat and proved that the so called element previously announced were in reality the different oxides.

All uranium minerals contain quantities of radium and radium is not known to occur in any mineral that does not contain uranium. In fact the ratio of radium to uranium in any mineral has been found to be fixed at about one part of the former to three million parts of the latter.

Although a large number of uranium minerals have been identified, only five of them, carnotite, uraninite (pitchblende), autunite, torbernite and samarskite have been used to any extent on commercial sale as sources of uranium and only the first two species mentioned are, or have been important sources of this element.

Carnotite.

Composition: A hydrated vanadate of uranium and potassium of doubtful formula. The pure mineral carries from 20 to 54 per cent U_3O_8 , from 7 to 18 per cent V_2O_5 , from 5 to 6.5 per cent K_2O , from .3 to 2.8 per cent BaO , and from 1.6 to 3.3 per cent lime, and traces of lead, aluminum, iron, arsenic, and phosphorus.

Color of powder: Canary yellow, paler

than the color of the unpowdered mineral.

Hardness: Soft; easily scratched with finger nail.

Fracture: Rarely occurs in large masses. Breaks like fine dry earth.

Specific Gravity: 4.1 or 50 per cent heavier than quartz.

Occurrence: Carnotite is usually found as a yellow powder encrusting or filling the interstices between grains or cracks in sandstone. May also encrust or fill cavities in silicified wood included in the sandstone. Occasionally loosely coherent earthy masses an inch or two thick are found. Sometimes associated with roscoelite, a dull green vanadium mica. Microscopic examination proves that the mineral is crystalline or has a scaly form.

Uraninite.

Composition: Essentially a uranate of uranyl are two different oxides of uranium, but it always contains some lead and calcium, usually thorium and zirconium, often the metals of the lanthanum and yttrium groups, the gases nitrogen, helium and argon up to two per cent, and small amounts of other elements including radium. Some iron is also present and it and water may be impurities. Uraninite rarely carries as much as 80 per cent uranium, but even the richest specimens contain only about $2\frac{1}{2}$ of 100,000, of 1 per cent of radium.

Luster: Usually dull metallic, sometimes greasy or pitch-like to dull.

Color: Black, sometimes brown, rarely gray or green.

Hardness: Sometimes soft. A trifle too hard to be scratched by a knife blade.

Fracture: Usually like glass or flint. Curved and sometimes uneven.

Specific Gravity: 9.7, 25 per cent heavier than iron. (Dull metallic) Sometimes only 6.5 to 4.8 for soft impure specimen.

Occurrence: Found in compact massive form, sometimes botryoidal or kidney-like. Occasionally granular. In this category

belong the sub-minerals pitchblende, sometimes in well formed crystals nivenite, and cleveite.

Autunite.

Composition: A hydrous uranium-calcium phosphate. $2\text{UO}_3\text{CaOP}_2\text{O}_3 \cdot 8\text{H}_2\text{O}$. A mineral of this formula will contain 62.7 per cent UO_3 or 53.2 per cent uranium and $1\frac{3}{4}$ of 100,000 of 1 percent of radium.

Luster: Usually pearly, similar to that shown by translucent mica.

Color: Light yellow, sometimes lemon yellow. The color of the powder is yellow white.

Hardness: Scales are usually too small to test them satisfactorily for the hardness, but mineral is considered very soft. Can be scratched with a finger nail.

Fracture: Splits or cleaves easily and smoothly into thin flakes like mica. Cleavage flakes are extremely brittle.

Specific Gravity: 3.1

Occurrence: Usually found in small nearly square platy or scaly crystals near or in mica masses.

Torbernite.

Occurrence: Thin tabular crystals commonly square, and sometimes micaceous masses. Rarely found in pyramidal crystal forms.

Composition: A hydrous uranium copper phosphate composed of $2\text{U}_3\text{CuOP}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$. A mineral with the formula will contain 61.2 per cent of UO_3 .

Luster: Usually pearly, similar to that shown by translucent white mica.

Color: Usually relatively light shades of green sometimes apple green, sometimes grass green.

....Color of Powder: Light green.

Hardness: Scales too small to be tested but mineral generally believed to be soft, scratchable with finger nail.

Fracture: Splits or cleaves easily and smoothly into thin flakes like mica.

Specific Gravity: 3.5.

Samarskite.

Composition: A niobate and tantalate columbate of uranium, iron, members of the yttrium and cerium group. The formula is uncertain. Usually contains about 10 to 12 per cent $\text{UO}(\text{UO}_3)$ 6 to 15 per

cent $\text{Y}(\text{Y}_2\text{O}_3)$, 2 to 6 per cent cerium oxide Ce_2O_3 , and 5 to 6 per cent niobium and tantalum (columbian) pentoxide, Nb_2O_5 and Ta_2O_5 , calcium, magnesium, manganese, tungsten, tin, titanium and other metallic minerals may also be present.

Lustre: Glassy.

Color: Jet black, sometimes dark brown. Powder is reddish-brown.

Hardness: Cannot be scratched by knife but by quartz.

Fracture: Smoothly curved like glass or flint.

Specific Gravity: 5.6 to 5.8 or 2 times as heavy as quartz.

Occurrence: Found usually in disseminated grains, veinlets or irregular masses.

Geologic Occurrence and Origin of Uranium.

Portugal.—Northern Portugal produces important uranium ores from pegmatites. The deposits are situated in a granite pluton, and to a less extent in adjacent schists of Cambrian origin. The uranium is closely associated with tin and tungsten deposits. Veins of galena, mispickel and of chalcopryrite are also found in the vicinity. The uranium occurs in pegmatite dikes which vary very much in thickness, disappearing at places and reoccurring a few yards farther on. Thickness of three to four feet is common. Variations occur also in regards to the dip and (to the) strike. The pegmatite consists of very coarsely crystallized quartz and feldspar, varying in quantities. The gouge is argillaceous and may carry uranium. When argillaceous material is found throughout the dike, it is usually strongly uranium-bearing. Chief minerals found are autunite, a uranium-calcium phosphate, and chalcote, a uranium-copper phosphate. Mineral content in these dikes varies much both horizontally and vertically. Autunite and chalcote are found above the water level; presumably an unaltered mineral of a different nature will be found at a greater depth.

Joachimsthal, Bohemia.—The mines of Joachimsthal have been worked since 1517. In 1545 the production of silver ore declined, since then, deposits were

mined for bismuth and cobalt, and for the last 25 years for uranium and for radium. The Joachimsthal District lies on the higher southern slope of Erzgebirge, southwest of its highest elevation, the Keilberg near the Saxony border line. Rocks are mica schists with east to west strike and to west to northwest foliation and north dip. Finely crystalline mica schists predominate in the vein area with intercalated layers of calcareous mica schists, crystalline limestones and coarse fibered mica schists. Gneisses occur towards the northeast while schists end abruptly against granite at the southwest region. Massive tourmaline granites cross the axis of the Erzgebirge. Numerous dikes of quartz porphyry traverse both the region northeast of the granite and the mineral area. Dikes of basalt and phonolite were intruded in Tertiary time. Veins are usually three to six feet in width with numerous stringers. The fillings are not the same in all veins, thus in the Mitternachtsgänge we find brittle clay with quartz and hornstone, and in the eastern veins it is mostly calc spar and dolomite, and both sets of veins sometimes show a brecciated structure. The ores in these gangues are stringers, branches, and pockets that are very spotty. Ores here may be divided as follows:

1. Silver ores (native silver, argentite, pybasite, stephanite, tetrahedrite, proustite, pyrargyrite, sternbergite, argentopyrite, rittingerite, acanthite, and cerargyrite.)
2. Nickel ores (niccolite, chloanthite, millerite).
3. Cobalt ores (smaltite, bismuthocobalpyrite, and asbolite).
4. Bismuth ores (native bismuth, bismuth glance and bismuth ocher).
5. Arsenic ores (native arsenic and arsenopyrite).
6. Uranium ores (pitchblende).

Near the lode fissures, the country rock frequently has been impregnated with extremely finely divided ore particles. The presence of minute granules of uranium pitchblende in a scapolite-mica-schist of that locality (first discovered by F. Sand-

berger by means of large scale ore concentration experiments) is most naturally explained by an infiltration from the lode fissures.

The veins traverse dikes of quartz porphyry and in turn are cut by dikes of basalt and wacke veins. Since these wacke veins contain interspersed argentite where they cross the ore veins, it is inferred that at the time of the eruption of the younger volcanic rocks the vein formation had not yet been completed.

Most pitchblende is found at the "crossings" of the veins and the uranium distribution is about equal, regardless of the direction in which the veins trend.

The pitchblende is not evenly distributed throughout the veins, but occurs in fragments and lenses in intimate association with dolomite and calcite. The carbonates in the vicinity of the pitchblende take on a red to reddish-brown color which serves as an indicator of the isolated bodies of ore. In the vicinity of Annaberg, on the Saxony side of the Erzgebirge, the silver-cobalt veins resemble these of Joachimsthal. At Johanngeorgenstadt the vein contains tin, silver, and cobalt ores. Where dolomite spar is found, the silver-cobalt ore contains pitchblende as at Annaberg. In the Gottessegen Mine the ore deposits which contain a vast amount of mica are of two types. One contains pitchblende with pyrite, sphalerite, and galena and sometimes marcasite, the other type contains pyrite, chalcopyrite, sphalerite, and galena with some gold and silver. Generally speaking the two types are not associated so that the miner has a choice either of pitchblende or of gold. The district has produced about 100 tons of ore in the last 12 years of which 3-4 per cent was UO_3 (1922-1934).

Olary, South Australia.—Carnotite is here found in cracks and cavities in impure limestone. Pebbles are in some places cemented with calcite, and little replaced by carnotite. Uranium and vanadium can be dissolved in sulfur water, and both metals are precipitated from soluble salts by organic matter. Radium is rarely found in the same region in

granitic masses. Radium breaks down into autunite, torbernite and tyuyamunite. Carnotite and tyuyamunite incidentally produce the bulk of the world's radium.

Cornwall, England.—Aside from the famous tin and lead deposits of the area, which have been mined since the days of the Romans, the area is also known as a secondary uranium producing district. Throughout the region there occur lodes younger than those carrying tin and copper deposits. These lodes are of different ages, but their association of the mineral district as a whole makes it probable that they are genetically related to the eruptive after-action following the intrusions of the granite and elvans. Some of these lodes contain minerals which also characterize tin lodes, such as arsenic and copper and in small quantities uranium, cobalt, and nickel ores. The younger lodes have been formed in fissures crossing the tin and copper lodes and in bearing they vary from due south and north to a north-westerly direction.

Of the younger lodes there are two well marked series, those containing uranium and nickel ores, and those which have yielded much iron ores and some manganese. In addition to these, argentiferous galena also occurs sometimes with zinc and iron pyrites in lodes, the bearing of which is varied, but is frequently either north or south.

The most important producer of uranium ore in Cornwall is the South Terras mine which is situated in the valley of the Fal. The country rock here is slate, with intrusive greenstone which has been quarried for road metal. The quartz porphyry is traversed by three mining properties. The uranium lode has a bearing north and south and an underlie to the west of about 10 degrees. It is said to vary from three to five feet in width, but the uranium ore is confined to a strip a few inches in width, consisting partly of pitchblende and calc and copper uranites, with copper pyrites, mispickel and galena, and small quantities of nickel, cobalt and chromium ores in a veinstone of quartz and green garnet rock. The "green ore" contains about 62 per cent of

uranium oxide, while the "dark ore" possesses about 36 per cent.

The ore in this mine occurs in light green, yellow and brown flakes, scales and crystals. The ore is light and friable, with a few specks of the hard variety of pitchblende have been found. A large proportion of pitchblende is expected to be found as the work is carried below the water table. The ore was sold (1922) at \$200 per ton the first quantity running as high as \$1400 to the lowest of \$110. Taken as a whole for the mine, the uranium lode is two to four feet wide, and there is a more or less continuous leader of valuable ore, varying from a knife edge, to a foot or more in thickness. Workings have now reached a depth of 90 feet below the adit, and only pitchblende is found in the lode, so that it is easy by hand selection to separate the high grade ore while the remainder is easily dressed by crushing and wet concentration. Present work and detail of the mine has been under the British Government and therefore information of any sort has been curtailed since 1938.

Canada, Great Bear Lake, Northwest Territories. One of the most important pitchblende deposits of our present day, at least where the supply of U. S. uranium is concerned, is derived from the Great Bear Lake deposits in N. Canada. The region was first exploited for radium and even though the distance to industrial areas in Canada is exceedingly great, the high price of radium has made operations here profitable. After the utilization of atomic energy, work in this area for the liberation of uranium is extremely great, (but) figures in regards to production and prices are kept greatly secret.

In the area, we find Pre-Cambrian sedimentary and metamorphosed rocks cut by grano-diorites. The pitchblende is derived from replacement lodes, stockwork and veins which have entered fractures and shear zones. Pitchblende is believed to have been derived from colloidal deposition in cavities. The minerals found are pyrometasomatic, hydrothermal and supergene, and consist of pitchblende, native silver, pyrite, chalcopyrite, quartz,

and compounds of iron, cobalt, nickel, copper, lead, zinc, silver, bismuth, manganese, and molybdenum.

Other lesser known Canadian deposits occur at:

Madoc, Ontario where uraconite is found as sulphur yellow crystalline crusts lining fissures in the magnetite in the Seymour ore beds.

Maisonneuve, Quebec: Samarskite was here found in the depth of pegmatite dikes made near Mica Lake. The material had a sub-metallic shiny lustre, brownish black in color and opaque. Specific Gravity of 4.9, hardness of quartz, and contained 10.75 per cent of Uranium oxide.

Villeeneuve, Quebec: Gummite, with a specific gravity of 3.78 and containing 38 per cent of uranium oxide has been derived from this area. Garnetiferous gneiss is cut by pegmatite dikes in this area. Pit-blende has also been found in this vein in close association with quartz, muscovite, microcline, albite, black tourmaline and garnet.

There are numerous smaller uranium deposits throughout Canada and special mention should be made in regards to Mamainse and Snowdon, Ontario, and to Murray Bay and Wakefield in Quebec.

Colorado, U.S.A.: Carnotite deposits, found to some extent in fossil logs in sandstone are the chief U. S. source of uranium and radium. These deposits are believed to be of secondary origin. The ores occur chiefly as impregnations into the sandstone which have filled cavities and other cracks.

At Green River, Utah, most deposits are exposed in gulleys that traverse the "reef". Carnotite is found in coarse sandstone overlain by conglomerates. Petrified wood and bone fossils lie exposed over the region. The carnotite stains are conspicuous near the wood and are heavily impregnated. The ore is found mostly in or near the wood or in cracks in the sandstone, although both the sandstone and the darker ores are lightly impregnated in many areas. Most of the ore here is dark in color. They may be divided into four general types.

1. Yellow carnotite—found mainly in cracks.

2. Dark brown siliceous ore impregnated with the carnotite.

3. Black ore much associated with carbonaceous material carrying some stains of carnotite.

4. Grayish brown laminated shale, rich in vanadium with some uranium.

However the above classification cannot be taken as perfect as smaller deposits have been found (and) in an extremely mixed condition.

Paradox Valley, Colorado: The ores in this district differ chiefly from those previously described in that they are more yellow, and carry a richer quantity of carnotite. Sandstone is here impregnated with carnotite and contains small kidneys of brown sandy clay. These kidneys have been found to be rich in vanadium. Some specimens taken are dark blue brown and black uranium ores, the dark blue ores being lustrous and carrying the most radioactive material. High grade carnotite in "bug holes" has been found, so soft that it can be molded with the fingers, the same kind of ore crystallized with gypsum, and red calcium vanadate (radiated form) some mixed with carnotite and blue vanadium ore. Most of the low grade ore on exposure to the air weathers to green, rose and yellow color. At places ores of different type are mixed while at others, the sandstone has been impregnated along lines of stratification producing alternate layers of carnotite and dark vanadium ores.

It is generally believed now that the carnotite originated from local concentration of material from material already present in the sandstone, and that its deposition as carnotite was determined by proximity to the surface and was partly dependent upon a semi-arid climate. The previously mentioned "bug holes" are about 30 feet long and only a few inches in diameter, with their walls encrusted with quartz and gypsum. The holes run downward at a slight angle into the upper layers of the ore body. One believes these holes to be funnels through which the ore travelled as most of them

are filled with high grade carnotite and some with vanadium. Their upper end leads into the above lying sandstone and finally into the country rock.

As a summary, it can be stated that uranium ores are nearly all associated with igneous acid rocks such as granites, pegmatite dikes, and quartz porphyry dikes. They may be found in veins cutting granites, or schists, or slates intruded by granite or porphyry dikes, and probably originated in solutions given off by these igneous rocks at the time of intrusion. In Colorado they are associated with pyrite and a little galena and zinblende, while in the Joachimsthal with silver, nickel, and cobalt ores, and in Portugal with tin and tungsten minerals. At the Great Bear Lake deposits we find pyrite and native silver associated with the uranium and at Cornwall, England, they are found in the tin and copper district. Carnotite deposits of Utah and Colorado are somewhat different in that the uranium-vanadium mineral carnotite occurs with other vanadium minerals as an impregnation mineral in sandstones and in cavities and cracks in the sandstone and the fossils.

Mining and Treatment.

Carnotite of the Utah and Colorado districts usually occurring in sandstones and the ore bodies at places are flat, lenticular and vary greatly as to size and extent. Ore is often found outcropping in the walls of the canyons which were cut into the sandstone beds. Prospecting as is also regular mining is usually carried on by means of cuts or tunnel works. Tunnel methods of mining are even used when the depth of the overburden is as little as five feet. Prospecting by churn and by diamond drill has also proved to be satisfactory. The method used is to drive a gravity tunnel into the formation, by hand drilling. Where the drill has outlined definite mineralized zones, inclined tunnels are driven so calculated as to come under the ore body. Ore can then be mined from the roof at low cost. In places where the ore is soft, great care must be taken so as not to lose the "fines" in which the high grade ore is usually

found. For this purpose a tarpaulin is placed on the floor of the drift. In the Rock Creek district where the ore is high and soft, pans are placed against the vein or under the roof and the ore is scooped into them. High order of ability and care must be used in the mining as so little is shipped with such an exceptionally large amount of waste remaining behind.

Both wet and dry concentrations have been employed on carnotite ores. Wet concentrations consist in the main of fine grinding, agitation and decantation, the finer carnotite mineral being decanted off and the coarser sand particles being left behind. Dry concentration involves pulverization and separation of the fine carnotite from the coarser sand particles by fans. Both the wet and the dry processes depend upon the softness of the carnotite mineral which tends to slime and (mineralize) pulverize easier than the sandstone rock with which it is associated. Pitchblende occurs mostly in veins and the methods of mining are therefore similar to other vein ore deposits.

In Cornwall, England, a small instrument called the alphascope is used to determine the presence of small quantities of pitchblende in ore opened by development work. The radioactive pitchblende is known to be present in the ground being tested when a continuous scintillation appears in the alphascope. This effect is produced by the influence of the radioactive mineral on zinc sulphide in the alphascope. The instrument resembles a short hand telescope several inches in length and about an inch in diameter. The high specific gravity of pitchblende enables it to be recovered from the rock gangue by ordinary methods of concentration; its concentration presenting no serious difficulty. Both uranium and radium are extracted from the respective ores or concentrates by leaching, followed by large scale chemical treatment.

Uses of Radium and Uranium

Radioactivity of radium is used chiefly in medicine; one of the greater uses is for the treatment of cancer as it has been found that cancer cells are destroyed easier by radioactivity than are normal

healthy cells. It is also used for detecting flaws in steels and as a luminous agent in clocks and other objects.

Uranium's primary use at present is for defensive purposes such as the atomic bomb and for experiments in regards to the utilization of atomic energy. It is also used as an alloy for steel, copper and nickel, giving the metals hardness and toughness. It is also used in a limited sense for paints, pottery glazing, ceramics, iridescent glass, brilliant fireproof yellow in paints, and gives an orange or black tint to pottery.

Statistics and Conclusion.

The last reports on the price for radium was \$89,000.00 per gram but prices vary each year. The last reports for uranium stated \$3.50 per pound for UO_3 , but the present price for the metal is undoubtedly much higher but kept as a strict secret by the U. S. Government. Production figures throughout the world are also secret.

Mlle. Gleditsch, assistant to Madame Curie, stated that carnotite carries approximately 0.00000375 grams of radium per 100 grams of mineral, carrying 16 percent of uranium and that for every gram of uranium there is 0.000000234 gram of radium. This means that for one ton of uranium ore, there would be 213 milligrams of radium or 396 milligrams

of radium bromide ($RaBr_2 \cdot 2H_2O$), the form in which radium is usually sold.

Because of the extremely small amount of radium present in the ore, the cost of separation is extremely high. Many experiments have been made in the United States in the attempt of separating uranium from the ore (carnotite) but it has been found that the cost of extraction of the minute quantities contained in the ore, including the cost of mining, transportation, chemical and technical knowledge was so great, that even the enormous price quoted for radium, the process did not pay.

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ADDITIONS TO THE MINERALS OF THE DISTRICT OF COLUMBIA AND VICINITY

By DR. TITUS ULKE

Washington, D. C.

The following three minerals should be added to the list which appeared in the January-February-March, 1936, issue of *Rocks and Minerals*. See also "Additions to the minerals of the District of Columbia and vicinity," by Dr. Titus Ulke, March, 1940, p. 81.

94. *Magnesite*. Massive, associated with deweylite, baltimorite (silicified asbestos) and with gem-quality serpentine, was collected in the spring of 1947 by James Benn of the U. S. National

Museum, at the Delight serpentine quarry about 15 miles N. W. of Baltimore, Md.

95. *Niter*. With gypsum. From Clark's Cave, Bath County, Va. Collected in August, 1947, by James Benn of the U. S. National Museum.

96. *Pigeonite*. A laminated or bladed greenish-gray variety of pyroxene, occurring in the trap-rock quarries along Goose Creek, near Leesburg, Loudoun Co., Va. Identified by Dr. William F. Foshag of the U. S. National Museum.

AN INTERESTING OCCURRENCE OF SMOKY QUARTZ

By **CLAUDE H. SMITH**

R. D. #3, Waterloo, New York

The area around Seneca Lake in the Finger Lakes District of New York State and for that matter, most of this section of the State represents the Devonian Age from the lowest to the highest strata. It is composed of limestones and shales buried under varying depths of glacial drifts and sprinkled here and there, sometimes very heavily, by glacial kames and drumlins. The Devonian strata outcrops occasionally on the surface but the stratigraphy of the region is seen mainly in the numerous Glens and ravines.

Although the area is a fossil hunter's paradise it has very few minerals that would grace a rockhound's cabinet. The minerals are poor in quality and chiefly composed of calcite, dolomite, pyrite with plenty of chert and flint.

Five miles north of Geneva, N. Y., is the little village of Oaks Corners in Ontario County. The quarry owned by the General Crushed Stone Co. starts inside the village and runs west for some distance. It has been worked for many years and is quite extensive, covering about three or four acres. The walls in places are 75 or more feet high. Fig. 1 gives a general idea of the quarry size and the height of walls. The rock is Onondaga

Limestone of Devonian Age, a rock that is very dark when freshly quarried but on exposure, weathers to a light greyish blue color.

During 1947, the author spent quite a bit of time in the quarry looking for nice mineral specimens and studying the rock formation and included fossils. As the rock is very dense, with very few cavities, the search was without results. At the time, the quarry workmen had blasted down the north wall and were working around the west side to the south. Every week I would follow the blasted rock around and was working on the west wall where there was a brownish layer that contained some pyrite not in specimen quality. By this time, it was early fall and the south wall had been blasted down so I was working my way down this section.

Almost at once, a limited section was struck that was filled with small black cavities. The color was due to small dark crystals on a black cavity background. What was interesting to me at the time, was the fact that they contained perfect transparent cubes of calcite, some of the crystals almost $\frac{1}{2}$ " in size. The shock of blasting, of course, had ruined most of



South quarry wall. Occurrence of smoky quartz is opposite author's car, under arrow, near bottom of quarry wall.



West quarry wall. Small structure on right is V-shaped made from railroad ties, open at back, and used as blasting shelter.

the crystals and it was very hard to get a small enough specimen of rock without shattering the crystal. After a lot of work a few good specimens were secured. A test was made of the dark crystals at the quarry and they proved to be calcite. About a bushel basket of specimens with cavities were brought home to study at my leisure.

As a lot of improvements had been planned for my home, it was late winter before an opportunity was found to go over and sort out the material collected during the year. In going over this basket of specimens everything was tested carefully before being disposed of. It became apparent at once, that some of the dark crystals were quartz. The crystals are generally small although a few were from $\frac{1}{2}$ " to $\frac{1}{4}$ " and large enough to study in detail. The crystals themselves are of a light smoky color and some have small black phantoms that give the crystals a much darker look.

Several visits made to this quarry this year has failed to reveal any additional cavities of this type although there are other cavities in profusion in this layer of rock. At present, the quarrymen are working the west wall and are slowly working around to the south. They should be blasting this section by summer and further study will be made of the

section that contained the smoky quartz crystals at that time.

Rockhounds Make Friends Easily

Editor R & M:

I believe Lew Lehr was wrong when he said, "Monkeys is the craziest people". They're not in it with Rockhounds. At the drop of a hat Rockhounds will shelve every other interest, muffle the telephone, hang a Quarantine sign on the door, drag out every rock in the house, and go to it! In no time at all everybody is talking at once, asking questions, exchanging ideas, taking notes, giving directions to new and better localities—old friends in half an hour because of a mutual interest in rocks! What strange alchemy is this that transmutes strangers to friends in so short a time? Is it a chemical action—a sort of witch's brew—an emanation rising from tables, chairs, and floor covered with an assortment of rocks and minerals? If so, it's the answer to the age-old question, "How to turn common rocks into solid gold!"

We had such an interesting evening with two collectors from Brooklyn, N. Y., and are grateful to you for steering them our way. They are making a chemical analysis on two of our doubtful minerals and gave us a lovely white tremolite from Canaan, Conn. They would accept nothing in return but we were able to direct them to the staurolite area in Claremont, N. H., where I hope they didn't get too wet in our daily rainstorms. They were going to look for triphylite at Chandler's Mills, N. H., this morning and go on from there.

Mrs. Vera A. Cram,

June 24, 1948

RFD 1, Newport, N. H.

SALAMANDER SKIN

By ROBERT H. MITCHELL

Charlemagne, King of the Franks, rose abruptly, snatched the table cloth from the table and threw it into the fire. Harun-al-Rashid's army was threatening his kingdom and he had called for a peace conference. Al-Rashid's ambassadors were much surprised when he drew the cloth from the fire unharmed by the flames. Thus Charlemagne averted war, for the startled envoys hurried away to council their leader not to make war on a man that could command such magic powers.

This, however, was not the earliest record of the use of asbestos for a Greek physician, Hippocrates, in 460 B.C. records the use of asbestos as a medicine. Callimachus, one of Greece's famous sculptors, was asked to construct a lamp to burn eternally at the feet of Athena. The wick of this lamp was made of asbestos and was not consumed by the flame as other materials were.

Pliny, the Roman naturalist, lived from 23 to 79 A.D. He mentions a "rare and costly cloth" from which napkins were made which could be cleaned by fire. He also mentions its use for funeral garments for kings.

In 1250, Marco Polo while traveling in Siberia saw fire resistant cloth which he was told was made from the skins of salamanders. The ancients believed these animals lived in fire. Being skeptical, Marco Polo traced the strange material to asbestos-bearing rock and learned how it was prepared.

So for almost 2000 years asbestos was a novel, mysterious, fireproof, silk-like material obtained from rock. William Lithgow, in the 17th century, writes of a stone from which linen cloth could be made which when put into the fire came out white and neat again.

The year 1877 sets off the modern history of asbestos from the ancient history of the material. It was then that the great deposits of asbestos were discovered in the Province of Quebec in Canada. The asbestos mining industry was born in that

year and thereafter asbestos became the basis for many practical products.

Of all the natural fibrous materials used by man asbestos is unique. The word asbestos is derived from the Greek and means incombustible. It is a rock material that can be spun into yarn and woven into fabrics. It combines such properties as fire resistance, flexibility, strength and resistance to chemical action with a fibrous nature. It is this combination of characteristics which is the key to its usefulness. Unlike the fibers of vegetable or animal origin the fibers of asbestos may be divided time and again into finer and finer fibers.

Asbestos is not a single mineral but a fibrous variety of several minerals. The principal commercial type of asbestos is Chrysotile, a variety of Serpentine. Serpentine is a green, waxy, dull, greasy or dull resinous looking mineral having a hardness of 2.5 to 4. Dark green, massive forms of the mineral are sometimes mottled and spotted with lighter greens or yellows which resemble the markings of a serpent, hence the name Serpentine. In certain localities this mineral is found as masses of fine parallel fibers which can easily be separated. This fibrous variety of Serpentine is known as Chrysotile. Chemically it is a hydrous magnesium silicate, $H_4Mg_3Si_2O_{10}$.

Normally this type of asbestos is found in veins of varying thickness with the fibers running perpendicular to the wall of the vein. The fiber length of this type of asbestos is usually shorter than the fiber length of the other minerals which are included under the term asbestos. It is often known as short-fibered asbestos.

One important deposit of Chrysotile is in northern Vermont. The fibers are not suitable for textile materials but are usable for other asbestos products such as asbestos-cement shingles. Long fiber Chrysotile of good quality comes from Arizona but the production rate is small.

In 1877 rumors circulated that moun-

tains of "cotton stone" had been found in the Province of Quebec in Canada. The supply of asbestos from this region appears to be large since the deposits cover an area of many square miles. Test holes indicate good material to a considerable depth. The mines in this area are several hundred feet beneath the surface. This area supplies a large part of the asbestos used in the United States.

In Southern Rhodesia asbestos occurs as a cross-fibred vein material in Serpentine. The area produces much high grade asbestos. Cross-fibred veins similar to those in Canada and Southern Rhodesia also occur in the Ural Mountains of Russia.

Among the fibrous silicates which are collectively known as asbestos are several minerals which belong to a group of minerals known as the amphiboles.

Tremolite, one of the amphibole group, was first discovered in the Tremolo Valley of the Italian Alps and derives its name from this location. Tremolite fibers are weaker than those of Chrysotile but are very resistant to chemical activity and are, therefore, useful as a filter media in industry. Tremolite asbestos deposits in Italy are extensive and important to the asbestos industry.

In 1907 a fibrous variety of iron-magnesium silicate was discovered on the property of the Asbestos Mines of South Africa. This amphibole was called Amosite, a name derived from the first letters of the company name. The fibers are exceptionally long, 12 to 15 inches, but are harsher and weaker than Chrysotile and are, therefore, not suited for textile application. They are often fluffed up and made into insulating blankets.

"Blue asbestos", so called because of its color, is another of the fibrous amphibole minerals and is known as Crocidolite, which means "wool-like stone". These fibers have high strength which make them valuable for special uses such as in making asbestos-cement pressure pipe. Chief locality of Crocidolite is in the Union of South Africa. Small quantities are found in North America in one location in Providence County, R. I. An-

other extensive deposit of good quality is found in Western Australia.

By infiltration of silica and the oxidation of the iron present Crocidolite is often altered to a silicious stone, fibrous in structure and possessing a chatoyant luster and a yellow to brown color. This mineral takes a good polish and is known as "tiger-eye".

Anthophyllite is a long fibered asbestos of the amphibole family which is of slight commercial importance because the fibers are weak and lack flexibility. The name of this mineral is derived from the word anthophyllum, meaning clove, in reference to the clove-brown color which it often possesses.

Actinolite, meaning ray stone, occasionally occurs in fibrous form as asbestiform actinolite and radiated actinolite but the fibers are usually weak and brittle and are rarely used commercially.

The Hornblende known as Pargasite, or Common Hornblende, is usually found occurring as crystals or granules but occasionally it is found as fibrous masses. These fibers like those of Actinolite are weak and of little value commercially.

No discussion of asbestos is complete without a mention of "Mountain Leather" and "Mountain Cork". These varieties consist of sheets or spongy masses of tough, matted fibers. Mountain Leather is sheets of the matted fibers while the Mountain Cork is composed of thicker matted fibrous masses. Both are so buoyant that they will float on water.

Mountain Wood is a more compact fibrous mass which resembles wood in appearance. None of these varieties of asbestos are of commercial significance since the few known deposits are too small in extent.

The unique combination of properties possessed by asbestos, make it capable of many practical uses. Most of these applications may be grouped under a few headings, based on product types, such as textiles, insulation and building materials.

Asbestos fibers may be spun into threads and yarns and woven into textile fabrics or made into cordage. Textiles thus produced are used for a number of

commodities such as brake linings and clutch facings, gaskets and packing where resistance to heat or chemicals is needed. Asbestos is used for fire curtains and projection booths in theatres to guard against fire. Fireproof clothing and gloves protect firemen and industrial workers against heat and fire.

Asbestos paper is used for heat insulation both in the form of flat sheets or in air-cell type of product. Another insulation product making use of the properties of asbestos is 85 percent magnesia which is a basic magnesium carbonate product reinforced with asbestos fibers. Asbestos blankets, used to insulate steam boilers and thus save heat loss and consequently save fuel, have already been mentioned. Table mats and pads, stove and refrigerator insulation and asbestos insulation cement do their part in protecting property from heat and conserving fuel.

Asbestos-cement products are familiar to us in the form of asbestos shingles. This product is portland cement reinforced by asbestos fibers and represents the chief type of asbestos building material. This type of product is made in the form of sheets, both flat and corrugated, tile and roofing.

Asbestos is an unique mineral having a variety of practical uses that contribute to our comfort and safety by conserving fuel and protecting us and our property from fire.

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GEOLOGIC MAPPING NEAR NEW YORK CITY

By THOMAS W. FLUHR

Within the confines of New York City there are a number of institutions of learning which teach geology. One would expect the region surrounding the city to have been mapped geologically with great precision. Unfortunately, this has not been done. Most of the local geologists devote their attention to the far ends of the earth and neglect opportunities close at hand.

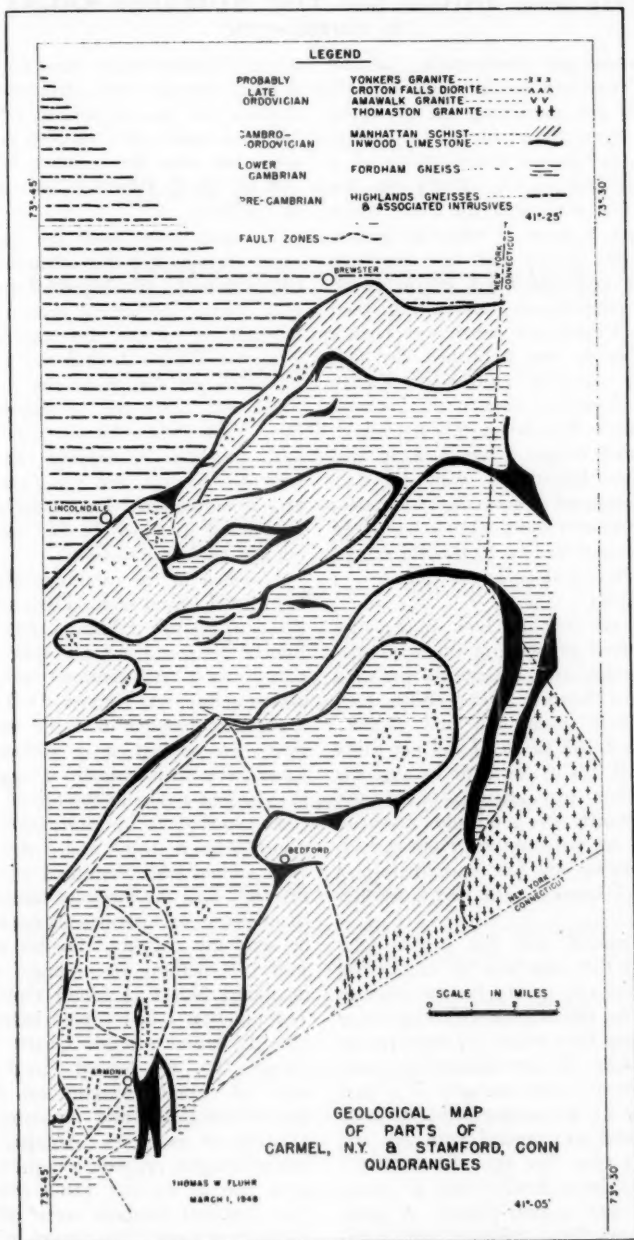
The New York City area itself has been mapped and described in a masterly publication, U.S.G.S. Folio No. 83, which, in spite of its age, has never been surpassed as a reference work on the local geology. However, no complete and accurate geologic map of the region immediately to the north of New York City, comprising the Tarrytown, Stamford, and Carmel quadrangles, has ever been made.

A map of the northern part of the Carmel quadrangle, together with the adjoining Clove quadrangle, was published by Dr. Robert Balk (1). A map covering

part of the Tarrytown quadrangle was prepared under the direction of Dr. Daniel T. O'Connell for use in conjunction with the field excursion of the 33rd New England Intercollegiate Geological Conference in 1937 (2).

The author, in connection with various engineering works, has mapped part of the region north of New York City, and has prepared a geologic map of parts of the Carmel, N. Y., and Stamford, Conn., quadrangles, which represents his interpretation of the areal geology. Other interpretations are possible, and numerous parts of the area deserve further study. In order to assist somewhat in filling gaps in the geologic knowledge of the region, the map is reproduced herewith.

- (1) Robert Balk: Structural and Petrologic Studies in Dutchess County, New York. Bull. Geol. Soc. Am., Vol. 47, 1936.
- (2) Daniel T. O'Connell: College of the City of New York. Geological Excursions in New York City and Vicinity. Trip 11. 1937.



THE OLD SAILOR ON THE NUMBERS RACKET

By TIMBER HITCH

All hands get comfortable, because this yarn may run on for quite a spell. I want to get something off my chest that has been there for a long time. Somehow or other I always think of it as the numbers racket. Don't get me wrong; I do not mean the kind where you put out a dime in hopes of getting back enough to buy that fine specimen you saw advertised in *Rocks and Minerals*.

The numbers racket I am talking about is the one I have been hearing ever since John Wiley & Son published the first volume of the 7th Edition of Dana's *System of Mineralogy* back in '44. I was up in New York City when this happened, and the first things I heard about this volume went like this: "Why did they have to change the numbering system—"; "—all the years I have spent cataloguing my collection according to the old system and now I have it all to do over again—"; and on and on.

Then I got my first look at the new book. Instead of starting off with diamond, Number one, the numbers started with gold, Number 1111. With each new chemical group the first number changed to 2 and so on. I did not think much of all this at the time because my collection was just getting started and consisted mostly of good old 210 (on account of my wife coming from Arkansas and having my first specimen in a box of knick-knacks). But that is another story.

I just figured that the people who thought up this new way of numbering minerals did not get to be the number one boys in the science of mineralogy without using their heads for other things than hat racks. If they thought the new way had merit, why not give it a trial run? After all, we seamen had something on this order to contend with not too many years ago. For ages the mariner's compass had been divided into 32 points and these into quarter-points. A good seaman knew these forward and backward. Then someone got the idea that

it would make things easier for all hands if the compass were divided into 360 degrees and courses steered by numbers. Well—it took a few years to get the idea over, but now the practice is universal and all courses, bearings, etc., are named by numbers.

I would have forgot the whole thing except for the fact that whenever a group of rockhounds got together someone always started the lament about the change of numbers. About this time I acquired a copy of Dana's *Text Book*. I had been trying to get a copy of the *System*, but could not locate one. I stopped in the New York Public Library one afternoon with the idea of copying the numbers from the *System* into my *Text Book*. I had already started this, using a friend's *Text Book* in which he had copied some but not all of the numbers.

I looked in the catalogue file and the first card I found said: "Dana's *System of Mineralogy*, 9th Edition, 1889." I had figured on using the 6th Edition but if there was a 9th Edition, so much the better. (Boy, was I green! !) I filled out a slip and handed it to the man at the desk. He looked at it and said there wasn't any such animal. I argued back that he had a card in the file on it.

He looked it up and there it was: Ninth Edition, 1889, and it did not look as if it had been disturbed since it was printed. Still the innocent novice, I took the volume to a table and opened it up to start my copying. Shades of Davey Jones! Something was wrong. Instead of Diamond No. 1, I found Gold No. 1. The numbers I had copied before didn't jibe. Diamond was 24. Quartz was 231. Calcite 715. On top of this I found a table of atomic weights on Page xii showed oxygen 8 and uranium 59.4, as a couple of examples. Another table of atomic weights on page xvi showed these same two as 16 and 118.8 respectively. The chemical symbols were unlike any that I had seen. The atoms of oxygen were shown by dots over the metallic ele-

A
SYSTEM
OF
MINERALOGY.

DESCRIPTIVE MINERALOGY,

COMPRISING THE
MOST RECENT DISCOVERIES.

BY
JAMES DWIGHT DANA,
SILLIMAN PROFESSOR OF GEOLOGY AND MINERALOGY IN YALE COLLEGE. AUTHOR OF A
MANUAL OF GEOLOGY; OF REPORTS OF WILKIE'S U. S. EXPLORING EXPEDITION ON
GEOLOGY; ON ZOOPHYTES; AND ON CRUSTACEA, ETC.

AIDED BY
GEORGE JARVIS BRUSH,
PROFESSOR OF MINERALOGY AND METALLURGY IN THE SHEFFIELD SCIENTIFIC SCHOOL
OF YALE COLLEGE.

"Hæc studia nobiscum peregrinantur....rusticantur".

Ninth Edition
REWRITTEN AND ENLARGED, AND ILLUSTRATED WITH
UPWARDS OF SIX HUNDRED WOODCUTS.

(11 SUB-EDITION, WITH THREE APPENDIXES AND CORRECTIONS.)

NEW YORK :
JOHN WILEY & SONS, PUBLISHERS,
15 ASTOR PLACE.
1889.

ment and the metallic elements had a dash through them if there were two atoms present.

I had to leave before I got through looking at this queer volume, which was just as well, because I was getting dizzy. I later mentioned this volume to several of my friends, but they all said I had been splicing the main brace too frequently. Still, as my father-in-law said to his brother as they argued about Elijah going to heaven in a chariot of fire: "I saw a picture of it". I saw the book and it said "Ninth Edition".

I left New York before I had another chance to see this book. I went back last October to attend the first meeting of the season of the New York Mineralogical Club. While there I took time to go back to the library and have another look at this strange volume.

When I asked for it, the man at the desk took me in to talk to Mr. R. R. Hawkins, Chief of the Science and Technology Division. He told me that I might get some interesting dope on this volume from Mr. Martin Matheson of John Wiley & Son. I wrote to him later and he answered my letter and explained that this volume was really an 11th sub-edition of the 5th edition. Due to some unknown reason, it had been numbered as a separate edition. He also forwarded my letter to Dr. Charles Palache of Harvard University. Dr. Palache wrote me a nice letter and offered his assistance in unravelling this tangled yarn. I have an idea that he thought I had been taking snake bite medicine when I saw the 9th edition.

Before I left New York I dropped in to see Dr. Fred Pough at the Museum of Natural History and told him about this volume. He very kindly got out copies of the older editions, from the first on. Then I began to see a very good reason why no one had any grounds for beefing about the change in the system of numbering.

Later on, after returning to my home in Old Virginny, I went to the Library of Congress in the District of Columbia and got the 1st, 2nd, 4th, 5th, and 6th

editions and compared them all. To get back to that 9th edition again for a minute, I found out that there was a 7th edition in the library of the Michigan College of Mining and Technology; Houghton, Michigan, dated 1885. Also an 11th edition, dated 1890, in the Detroit Public Library, Detroit, Michigan. Just to keep you folks from saying what others have said before, one picture of the title pages appears on page 701.

Back now to the numbers. The whole thing boils down to this. The 1st Edition, 1837, had a system of numbering entirely unlike the present. Diamond was 389, gold 463, quartz 397, corundum 387, etc.

The 2nd edition had no numbers. The minerals were listed in classes, orders, and genera. Dr. A. Pabst, of the University of California, Berkely, California, explained these classes, etc., in a fine article on the new edition of the *System* in the December, 1944, issue of *Rocks and Minerals*.

I could not get my hands on a copy of the 3rd edition, the only one I know of being in the library of that College in Michigan about which I spoke awhile ago.

The 4th edition, 1858, had no numbers; the minerals being listed in sections and groups. The 5th edition, (or 7th, or 9th, or maybe the 44th) had numbers, but as I said before, they were not as I knew them.

Only in the 6th edition, 1892, did the numbers take the form that we are all familiar with and use with our collections. With all this before us, can any of you good people give me one valid reason why any one should object to the change in numbers in the new 7th edition?

Personally I aim to start changing the labels on all my rocks, whenever I can save enough beer checks to buy me a copy of the first volume of the new edition. At that I won't have much to do until the new volume on silicates comes out and all my SiO_2 ceases to be dioxides. Maybe all this gab doesn't mean a thing, but I have had a lot of fun getting it all together, and I have learned a lot in the process.

Before I quit I want to extend my thanks to all the people I have mentioned and to Miss Madeleine Gibson and Mr. N. F. Kaiser of the Michigan College of Mining and Technology, and Mr. Robert E. Runser of the Detroit Public Library. All of these people who are not rockhounds ought to be, because they were

as nice to me as rockhounds. That is tops in my book.

Well—summer is here and it is time to stow the winter gear and start polishing up the hammers and picks before the missus gets me tied down to the lawn mower and garden tools. Maybe I will have another yarn for you on some other voyage.

OPTICAL FIRM BUILDS UNIQUE UNDERGROUND LABORATORY

ROCHESTER, N. Y.—One of the world's most unique optical laboratories is now under construction.

Vibration-proof and designed to control temperatures to within one hundredth of a degree, the underground laboratory is being built by Bausch & Lomb Optical Company. Upon completion of the project, in itself a scientific feat, the laboratory will house engines used to rule diffraction gratings.

Designed by John J. Esterheld and Michael M. Serron, Bausch & Lomb architects, the laboratory is being built on solid rock, 10-3/4 feet below ground level. More than 175 tons of concrete and six tons of reinforcing steel will be used in constructing the building which is 30 feet long, 16 feet wide and nine feet high on the inside.

Side walls, made of layers of four-inch brick, waterproofing, insulating material and 14-inch steel reinforced concrete, will be 21 inches thick. The floor measures 13 inches in thickness, and will have a special vibration-absorbing covering. The roof, designed to support a 250-ton covering of earth which will provide the required insulation, will be 18 inches thick. Interior walls and ceilings will be sealed to prevent vaporization.

The extreme precision required in ruling diffraction gratings with diamond tools explains the laboratory's unusual construction specifications. Gratings, used in spectrographs in place of the usual quartz or glass prisms, are small optical surfaces ruled with 15,000 or more straight parallel lines per inch.

"For proper performance, each line of the grating must be positioned accurately to within one millionth of an inch," according to David Richardson, Bausch & Lomb physicist, who is in charge of the grating ruling program. "To attain this accuracy," Richardson said, "the laboratory must provide very precise temperature control and complete freedom from vibration."

Long before construction blueprints were drawn, Richardson related, a survey of several Rochester sites was made to find one in which vibration would be at a minimum. A plot adjacent to the firm's employment office was selected. Also of concern was whether the laboratory should be constructed above or below the ground. The latter was chosen to provide a higher degree of thermal isolation and freedom from other disturbances.

Pits three feet wide, seven feet long, and two feet deep are provided for the installation of massive supports for each ruling engine. Air conditioning equipment will maintain a temperature within the laboratory constant to better than one tenth of a degree Fahrenheit, and in the inner rooms, to within one hundredth of a degree while the engines are actually ruling gratings. The air conditioning equipment will also remove dust and excessive humidity from the laboratory air, Richardson said.

He related that the problem of ruling diffraction gratings has attracted the attention of physicists for more than a century. Capable of separating light waves

(Continued on page 706)

THE OURAY, COLORADO, AREA

By KARL HUDSON

Durango, Colorado

The great San Juan Mountain Country in Southwestern Colorado has much to offer, for the student of geology and mineralogy. Its interest does not stop there, for some of the most rugged and beautiful country in the Rocky Mountains is found in this great range.

Originally a great dome, approximately 100 miles long by 50 miles wide and which may have involved 20,000 to 30,000 feet of strata, it has been glaciated and otherwise eroded in such a manner that in some places an exposed face, of layers some 3,000 to 4,000 feet deep may be observed. This erosion has cut down to the pre-Paleozoic and to some of our oldest rock formations. Remaining are many great peaks reaching an elevation of 14,000 feet or more, separated by deep canyons.

One question has always intrigued me. Why do so many of our Rocky Mountain peaks reach an elevation within three or four hundred feet of that of Mt. Whitney many hundreds of miles away and the highest point within the boundaries of the United States? The San Juan Mountains have often been called the American Alps for very good reasons. Not many climbers, if any, have scaled all of their great peaks.

There are two main highway entrances into this area. One thru Durango from the south and the other thru Ouray from the north. While the highway from Durango is more gradual in its ascent the most spectacular entrance is at Ouray, one of Colorado's most beautifully located towns. Driving south from Montrose thru the foothills one is suddenly in the very heart of the range. A great amphitheater has here been eroded into the great dome and strata upon strata and peak upon peak rise abruptly from the town on three sides. Possibilities for geological study are practically unlimited.

Subsequent to the great doming of the area, volcanic activity and later extensive fissuring has permitted mineralization to a

very great extent. Great mine dumps may be found in any direction from Ouray. Fortunes have been and are now being taken from the area. Passable auto or truck roads lead to some of these mines. Others are reached by foot or pack-horse trails.

The student mineralogist could spend a large amount of time in the Ouray area. Minerals reported from Ouray County include polybasite, rhodochrosite, stromeyerite, kobellite, beegerite, huebnerite, pyrite, galena, sphalerite, chalcopryite, tetrahedrite, argentite, pyrargyrite, fluorite, gypsum, barite, azurite, malachite, hematite, amethyst, enargite, pyrolusite, gold, covellite, etc.

The great Camp Bird Mines are located some eight or ten miles south of the town of Ouray. The mill and a large dump may be reached over a steep but usually passable truck road. Get local information as to the condition of the road, etc., before going up. The Camp Bird Mine is the most beautifully located mining operation which the writer has ever seen. A small valley located just below timberline and surrounded by 12,000 to 14,000 foot peaks is the setting. The principal mines are located some three miles farther and far above timberline but many minerals may be seen in the dump near the mill, including galena, sphalerite, fluorite, specular hematite, quartz and many others. Permission to collect should be obtained at the offices of the King Lease. Those in charge have been found very courteous and accommodating. Let's keep it that way.

Small but beautiful crystals of azurite and malachite have been found at the Senorita and other small mines about four miles northeast of Ouray. A truck road turns off the main highway about one mile west of Ouray and passes the Bachelor Mill. Take the first left hand fork on this road and then walk up the second rather steep truck trail to the right for about one mile.

One of the largest operations in the San Juan Mountains is the Treasury Tunnel about one-half mile north of Red Mountain Pass and south of Ouray. The main highway U. S. 550 passes the large mill and dump. This tunnel is driven some four miles thru the mountains to a point near Telluride and cuts many of the noted mineral veins of the locality. Get permission from the Idarado Mining Co. office to collect from the large dump near the highway. Chalcopyrite, galena and sphalerite are some of the minerals. Other mining operations in this vicinity have yielded many minerals including argenteite, enargite, etc.

Poughkeepsie Gulch, reached by a truck trail which turns off the highway between Ouray and Red Mountain Pass, is a noted mineral locality. This truck trail is not recommended for a standard passenger car.

There are literally hundreds of smaller mining operations within a ten mile radius of Ouray and it is recommended that the student or collector give plenty of time to a stay here.

NEW FRIEDENSVILLE ZINC MINE

By CHAS. A. THOMAS

706 Church Street, Royersford, Pa.

The writer has made several trips to the new zinc mine at this famous locality in an effort to get a sort of preview of what to expect when actual mining for ore begins to take place. Friedensville is a small hamlet 3 miles south of Bethlehem, Penn.

A very modern mine opening is already in place and the rock removed to build the "head" looks very much the same as the dump material that can be seen at the old areas nearby. Hollow lumps of goethite-limonite were observed in the debris which was piled close to the edge of the public highway. Bluish limestone with thin veins of white calamine are also in evidence. Small glistening crystals were observed on a limonite coated piece of limestone very near the edge of the public road and was picked up for future study.

It should be noted that this area is

Heavy winter snows make the collecting season rather short in this area. July and August are perhaps the best months. Altho mining is carried on during the major portion of the year at some mines, truck roads and trails become blocked and dangerous during the winter months.

Red Mountains (there are really three of them) are more exotic in color than any formation which the writer has ever seen. Highly mineralized and reaching an elevation far above timberline, these peaks are a color-photographer's dream. The deep red, orange and yellows, contrasting with the blue sky above and the pale green grass and deep green spruce below leave nothing to be desired. They are easily photographed from the highway.

Good accommodations, a large municipal swimming pool, hot springs, the most beautiful mountain scenery in the United States and a wonderful summer climate make Ouray one of our leading summer resort towns for those who really want to see and live for a while at least in Colorado's unspoiled mountains.

the property of the New Jersey Zinc Company and its no trespass signs should be honored by anyone visiting the area. On the last visit, the writer talked with a representative of the contracting firm who stated that many visitors have stopped to view the operation and as many as fifty on Sundays try to get permission to look over the small pile of rock that came from the shaft opening. There is no doubt that such swarms of visitors would greatly hinder the normal operation of the mine if they were allowed to go into the area at will.

That there will be some extremely interesting specimens brought to light, is, in the opinion of this writer, a foregone conclusion. Although the new area is quite near the old mines, it is very possible that new minerals may be found. It is hoped that, as these specimens are found, they will be brought to the atten-

tion of geologists and mineralogists all over the world. Probably the pages of *Rocks and Minerals*, from time to time, will contain enlightening articles about this old favorite locality.

Below is a short rehash of minerals found at the old workings:

Quartz: Long distorted and perfect crystals, also fetid. Some amethystine.

Dolomite: Small colorless perfect rhombohedra often with gemmy golden sphalerite and bright yellow-green smears of greenockite in massive dolomite.

Asbestos: Mountain leather, thin coatings on rock.

Sphalerite: Fine grained masses of grayish ore; gemmy yellow crystals and yellow masses.

Greenockite: Yellow, orange-yellow, greenish-yellow and brownish stains on the gray sphalerite.

Pyrite: Most often altered to limonite.

Aragonite: This is zinciferous and is often closely associated with white calamine and colorless calamine. In some specimens, this material is highly fluorescent under the Mineralight and the trans-former longwave. The phosphorescence after a shortwave charge is very startling and the decay period in some specimens has lasted for nearly an hour. The color under longwave is orange; shortwave, bluish to white to buff and very bright.

Smithsonite: Micro crystals, scalenohedra noted in small cavities.

Hydrozincite: Reported as porcelain-like or earthy masses.

Malachite: Reported but not found by the writer.

Calamine: Excellent colorless, brilliant luster micro crystals and larger milky crystals. Beautiful layers of compact crystals and sheaves of water-clear micro crystals in cavities in limonite and goethite with greenockite and gray sphalerite.

Allophane: Reported but not found by the writer. White botryoidal and stalactitic masses.

Sauconite: (Kaolinite) white, gray, brown, buff, yellowish, noncrystalline.

Halloysite: White compact porcelain-like masses, some with a yellow stain from greenockite or sulfur. A zincifer-

ous clay, often greatly weathered and sings when immersed in water. Some halloysite contains fluorescent aragonite and calamine which phosphoresce in bright starlike spots after a charge with the shortwave.

Goslarite: Efflorescences of minute white needles. Probably found in freshly mined material or slightly weathered rock. Not found by the writer.

Pyrolusite and wad: Reported but not noticed by the writer.

Almandite: Garnets reported by others may prove to be cubo-octohedra of pyrite which has changed to a fairly shiny, hard limonite.

Marcasite: Noted in sponge-like quartz closely associated with powdery gray sphalerite. Odor of sulfur very pronounced in this material.

Hyalite: Thin coatings on quartz and quartzose-limestone, not fluorescent but may account for rare yellow (bright) fluorescence in some ore specimens.

Furnace cinders: Highly fluorescent yellow-green fusing product in cinder clumps and on flue and fire-brick. Probably a synthetic zinc orthosilicate. Excellent reaction under longwave. Also a brilliant yellow calcium-like mass was noted in cinder clumps which had adhered to flue linings. This material is not fluorescent; may be contamination from cadmium sulphide.

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OPTICAL FIRM BUILDS UNIQUE UNDERGROUND LABORATORY.

(Continued from page 703)

according to color, ruled gratings have rapidly increased in importance during recent years, due to the fast diminishing supply of optical quartz. Within the next two years, the new laboratory should provide a supply of high quality diffraction gratings.

RELIGION AND THE MINERALOGIST

By ANTHONY THURSTON

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In my travels about the country collecting minerals and fossils, I have often been impressed by the attitude which other collectors take toward the Supreme Being. In most cases it seems that those who have taken the time to look into the earth have become more conscious of God and of His nearness to us. I have in mind, however, two collectors who have never found God. It is to these and others like them that I have written this article, for they cannot enjoy the full pleasure of their hobby until they see God's hand in the minerals they collect.

If we want to believe in God no words can possibly clarify the lessons taught in one crystal, a fossil, a lump of coal, or the smallest grain of sand. Each is a fragment of the perfect order which prevails, and always has prevailed in our universe. Many imagine at first glance that there is no system or order to the world, other than the laws set up by men to explain natural phenomena. With a little clear thinking, however, it will be evident that these laws of nature are not the laws of men at all, but His law, revealed when the time was right to those people best fitted to receive them and teach them to the world. The laws of men may be changed, but who has ever altered the laws governing crystallization or the combination of chemical elements in proportion? Can the symmetry of a given crystal form be altered without the crystal being changed? Why do all crystals fall into only six systems instead of a hopeless jumble of angular figures? Why? Because that is God's law. It is true that men may find new alloys which do not occur in nature due to instability or lack of the proper elements in pure concentrated form, but still these elements unite by the same fast rules. Atomic energy may seem to be a contradiction of this and you may feel that the splitting of the atom is a new source of power which belongs to this world alone, yet I am sure it will be proven, if it has not

already been proven, that this is the fuel which keeps the stars aglow. Man has not created a new source of energy but only liberated the forces God placed there for his use.

The universe, the world, and all the life upon it is an orderly arrangement of chemical elements all guided by a single thought. This must be true, for it is impossible to believe that this order could have originated by chance, or if so, that it could sustain itself without rules. Le'monte du Nouy shows us in his book, "Human Destiny," the tremendous odds, running into billions, which are against our universe and life coming into existence by mere chance.

At first glance the rocks of our world seem to be a hopeless mass of disorder since we see only a tiny portion of the exposed edges. There is order, though, and within our narrow limits of observation we have discovered parts of that order. Could we but see the earth cut up in sections we would see the rocks like layers of colored sand in a bottle. Man has not been content to leave the rocks alone and as far back as the days of the Romans, observing men were wondering how fossils got into the rock formations. However it was not until the time of Murchison that God began to open the eyes of men to the truths within the rocks. Werner and others had held theories and made many declarations before, but from this time on steady progress was made.

Now that the world had the background to fully understand what God wished to teach, He began to select His disciples as Christ selected His, while on earth. Men with faith to teach the world. I fully believe that the great men of science are given insight and faith in their work by the Supreme Being. There have been many who have had all the opportunities of success, yet were never able to enter the gates of knowledge. Others with less than average ability in

school and practically no opportunity have made outstanding discoveries. Can it be a result of faith? I believe it is.

It was faith in God and faith in himself that drove Sir Roderick Murchison onward to discover the Silurian System, and to contribute later to the Devonian and Permian Systems. Can you still say that this man who was educated in a military college suddenly became a great geologist without having the truth revealed to him by some Being greater than man? How could he, or any of the other geologists of his time, have had the faith and courage to proclaim their discovery in a world so critical and anxious to brand such men as heretics, without outside help.

The history of the world is full of such outstanding personages who possessed an enormous amount of driving power but no desire for personal worldly gain. Their reward was not in worldly things. Such a person was Edward Drinker Cope who began writing at the age of nineteen and in a period of six years between 1860 and 1866, wrote fifty-eight publications. He earned enumerable titles during his life and possessed so much energy that at the time of his death he had named 34.8 percent of the known fossil vertebrates in North America. Could any man cover so much ground in a lifetime without some additional source of energy?

Another colorful figure in the field of Geology is that of James Hall. He knew from the start what God intended him to do and he wrote profusely on the fossils of New York until they filled many huge volumes. Some writers make it appear that he was an ambitious man who forced his way to the top of his field, but I feel he had to do this for he knew it was the only way he could complete the work expected of him during his life.

Blind chance could not account for the discoveries of science any more than it could account for the molecular arrangement in crystals. Therefore we must accept and realize the only other alternative. A system. And there is a system directed by an intelligent Being.

Now you say, suppose there is a divine guidance. Suppose the world and all things in it were created purposely, how do we know He is still with us? Where are the miracles of the Bible days? Why do we have no miracles today? My answer to you is, we do have miracles. Miracles have occurred all through history and are still happening. I say to you, open your eyes and you shall see great miracles everywhere.

Everyone knows that through faith Christ healed many people yet few of us realize that through modern medical discoveries many thousand have been healed as a direct result of the scientist's faith in his work. Was not Edward Jenner's discovery of the smallpox vaccine a miracle? Did it not save millions of lives? And to the mineralogist or geologist, is it not a miracle that our natural resources have been given to us in such abundance? The coal, petroleum, iron and other natural products would never have been formed without special conditions. Such slight changes in climate during the Carboniferous period would have prevented coal from forming and such slight changes later might have destroyed it. Truly the natural products of this world and the civilization man has been able to build from them is one of God's greatest and most obvious miracles. Our whole nation is founded on the natural products of the earth and it is the placement of these products which indicates how, where, and why we live in certain parts of the world and not in others. Upon these resources the course of history has been founded in the past and will continue in the future.

God works His miracles through all men who believe yet often His ultimate aim is obscure. Little did the world realize that Haüy's discovery of the geometric law of crystallization would bring mineralogy up from a heap of rubbish to an orderly system or that Dana at the age of 27 would arrange the minerals into a system so perfectly that it has needed little or no revision. It was only after years of progress that the perfection of

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DECORATIVE MARBLES—THE GLORY THAT WAS ROME.

By JOHN S. ALBANESE

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Mineralogy, as a science, is comparatively young, but as an art, it is as old as the Stone Age. Since bright colors have always attracted attention, it is little wonder that rocks and minerals were among the first objects to be studied by the primitive peoples.

Before man discovered how to recover metals from the rocks, he used stone for implements and for decorative purposes, such as personal adornments. Thus art had its first expressions in stone.

The ancient civilizations, as the Egyptians, used great blocks of stone for their colossal structures, but the Romans were masters in the display of color. The glory of the old Roman Empire was set in a riot of decorative marbles, breccias and porphyries with great variation in texture and strongly contrasted colors. Fine marbles were plentiful in Italy when the patricians began building their stately villas, but stones of greater beauty were brought to Rome from Greece, Northern Africa, the Levant, Persia and places as remote as India.

I have a collection of polished slabs of these fine decorative stones which were excavated from ruins in and near Rome during the nineteenth century. But for their relative softness, some of these stones would today make rare and colorful settings for jewelry. Indeed, some of this material would make some of our modern collections of agates, woods, jades and other opaque material look very plebeian.

For example, there is a decorative stone in this collection known as "Occhio di Pavone". This Italian name means "Peacock's Eyes". This is a lumachella composed of "anomia ampulla", a sea shell. There are different kinds of "Occhio di Pavone", the rarest having white shells in a violet ground.

Then there is another lumachella that is known as "Astracane Dorata". This name is given on account of its golden color. It is very rare, there being

only two large specimens in Rome (two columns in the garden of the Palazzo Corsini). Some authorities think this was quarried in Astracan, while others believe it was quarried near Agra, India. Another masterpiece in color and design is "Breccia della Villa Adriana". This name is given by authorities because it is found in the greatest quantities in Hadrian's Villa, where it was evidently used for sheathing and panelling. By some writers it has been called "Breccia di Quintilius", because it was also found in the villa of Quintilius Varus. It is one of the rarest and most beautiful of all decorative stones, and also the most expensive.

Another awe-inspiring marvel of the mineral kingdom is "Breccia Serravezza Antica". This has angular white fragments in a purplish ground. It was found in the ruins of the Palatine.

A marble that would rival the accomplishments of the most celebrated painter of marine scenes is "Marmo Cipollina Marino", of a beautiful sea green color, with veins so metamorphosed that ocean waves are almost faithfully reproduced. And to make the picture complete, a distant cloud bank can be seen in the background. Another marble that deserves honorable mention in this list is "Marmo Fior di Persica". Translated it means "Peach Blossoms", and looks like the real thing, except that no branches are shown.

There are many other varieties equally colorful and showy. What puzzles me is why wasn't this collection placed in an Italian Museum? Perhaps because the Italians have better collections in their museums, and what I have merely represents "Chips from the Marble Quarries".

The above collection was part of the Robert Morton Collection, which I acquired some months ago. It was brought to this country around 1860, and some of the pieces were ancient, that is, had already been in very old collections before Mr. Morton acquired them. As I under-

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SOME MINERALS OF BEDFORD, N. Y.

By DANIEL BLACK

1819 Beverly Road, Brooklyn, N. Y.

INTRODUCTION:

Bedford Village, a small township in the eastern part of Westchester County, is the seat of the pegmatite deposits of southeastern New York. Prevalent throughout Westchester County are numerous pegmatite dikes, occurring in the Manhattan schist, one of these situated in a small hill approximately one-half mile southeast of the village itself. Three quarries, Kinkel, Colgate and Baylis, were cut out of the hill over sixty-five years ago. Colgate and Baylis were completely abandoned during 1943 due to the high cost of operations. The list of minerals found at Bedford is both interesting and imposing from the collectors' viewpoint, illustrated by the frequent visits of avid hobbyists.

LOCATION:

A standout in the popularity of Bedford is the relatively easy manner in which it may be reached. Bedford, itself, is approximately, 17 miles northeast from the center of White Plains, N. Y., and 25 miles west from Bridgeport, Conn. One in Bedford, one should be presented with no difficulties in securing the exact location of the quarries. Banksville, and Greenwich Rds., cutting off Poundridge Rd., (indicated on map), will lead one to the quarries.

THE QUARRIES:

There are in all probability over a dozen quarries in proximity to Bedford; but only four of these, Kinkel, Clinchfield, Colgate and Baylis, are deserving of recognition in this paper.

Kinkel quarry, located on the eastern slope of the hill, has long been famous for its minerals. The quarry, however, has not been worked for many years.

Clinchfield quarry, located near the crushing plant, is being worked by the Consolidated Feldspar Corporation. To all appearances, it seems as if the present workings will be discontinued in the near future and operations on a different part of the dike will be commenced, in view of the fact that in many places the drill-

ings have come in contact with the country rock. The quarry consists of two levels, the upper and the lower, which are parallel to each other. The upper quarry, (not in operation), is the better mineralogically. Permission to enter is readily obtainable from the watchman.

Colgate quarry is located on the slope of the middle of the hill, and is completely filled with water. An extensive dump, comprised of Feldspar and Quartz, however, offers considerable material for the collector.

Baylis quarry consists of two levels, the lower one being partially filled with water. The upper level, fortunately, presents a formidable assortment of fine and rare occurrences. This quarry is, in the opinion of the author, the best for collectors.

MINERALOGY:

AUTUNITE: One of the alluring factors of Bedford is the fine yellow-green, fluorescent Autunite which occurs there. This is found as bright tabular plates, associated with Uranophane on the brownish colored Microcline. Care must be taken in working it out since the flakes are easily rubbed off the matrix.

AUTUNITED MICA: This is a type of Muscovite which contains yellow flakes of Autunite. Sometimes, however the Autunite is not visible to the eye but can be detected by a field Mineralight if this is available. This material is readily obtainable in the dumps and on the quarry floor.

BERYL: This silicate of Beryllium is found at both Kinkel and Baylis quarries but occurs more extensively at Baylis, as large yellow, striated crystals. Perfect crystals are common but difficult to remove without shattering. The crystals occur in a large pocket on the upper level, formed horizontal to the ground and are for this reason, hard to remove in entirety. Gemmy Beryl is rare. Some crystals can be found, distorted into odd shapes by their close contact.

BISMUTHINITE: This rare Bismuth sulphide is found as disseminated blue-gray grains and small crystals at Baylis, associated with Muscovite and Quartz. A large mass of it can be noticed protruding from the quarry wall, but sizeable pieces are practically impossible to remove due to its awkward position on the wall. Every effort was made to remove it with crow-bars and hammers, but to no avail.

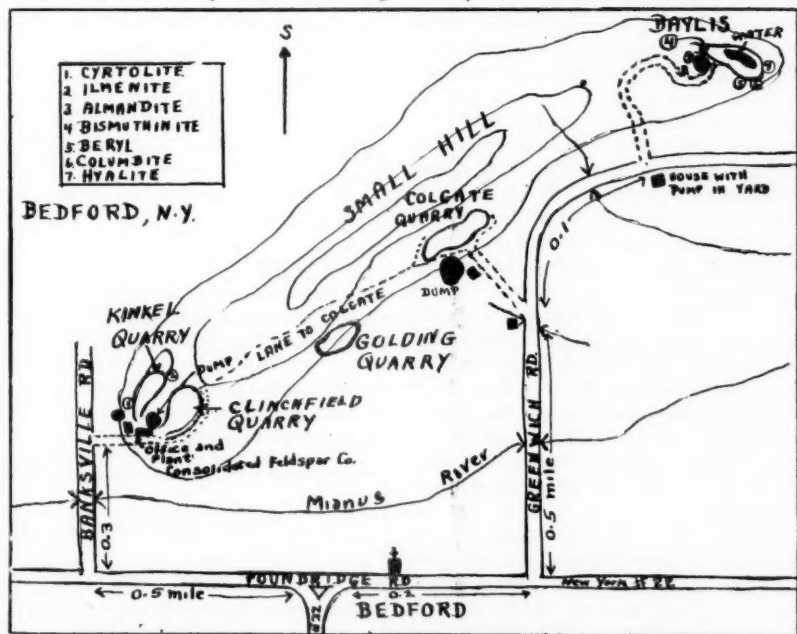
COLUMBITE: The comparatively rare oxide of Columbium and Tantalum occurs as heavy, bluish-black masses and crystals in the pegmatite and Beryl. It is found to a greater extent at Baylis but is also noted at Kinkel quarry. A large, orthorhombic, black crystal was found by the author in the dirt overhanging the Beryl pocket at the top of Baylis quarry. Many partial and broken crystals can be found in this pocket.

CYRTOHITE: An interesting and rare occurrence at Bedford is the mineral Cyrtohlite, bearing 51½ percent of the rare element Hafnium. This mineral is found as chocolate-brown, waxy masses. Being

strongly radio-active, it usually discolours the material in which it comes in contact with. Thus, a discoloration of the pegmatite is a good sign of the presence of Cyrtohlite or some other radio-active mineral. It occurs, although not abundantly, at the top of Kinkel quarry in a series of boulders. An excellent, large, crystallized specimen was found in 1946 by O. Ivan Lee, of the New York Mineral Club.

FELDSPAR: (var. Orthoclase, Albite and Microcline)—All these varieties are readily found at the quarries. Large and perfect crystals may often be broken out from coarse Quartz and Feldspar masses. Carlsbad twins are also obtainable. At Baylis and Colgate both Microcline and Albite are extremely plentiful.

GARNET: (var. Almandite)—Good, moderately large isometric crystals may be secured in a series of boulders to the left of the dump at Baylis. These crystals are often as large as 1 inch and a half. The quality and quantity of the Garnets at Baylis are much better than at the other



Sketch map showing some feldspar quarries at Bedford, N. Y. (Not to scale).

quarries.

HYALITE: An occurrence not to be overlooked, is the strongly fluorescent variety of Opal, Hyalite, which is found at the extreme end of Baylis. It occurs as translucent, granular, greasy formations on Smoky Quartz, the white Hyalite making a strong contrast with the dark quartz.

ILMENITE: This oxide of Iron and Titanium, occurs as black, sub-metallic plates, associated with a light-gray quartz. The Ilmenite is found chiefly at the lower level of Clinchfield quarry. The plates range from a minute width to one-tenth of an inch. They are usually covered by a thin iron stain but this may easily be removed by an oxalic acid treatment. A unique occurrence, found by Mr. Edward Marcin of Brooklyn, was a hexagonal crystal of Ilmenite with a Tourmaline crystal intergrowing.

MICA: Muscovite and Biotite are the varieties occurring at Bedford, Muscovite being the more abundant. Large "books" of Muscovite, often as wide as one foot, protrude from the quarry wall. Small crystals can be found at all quarries. Biotite, while not so plentiful as in the past, is found only at Kinkel to any extent. Crystals of Biotite are a rarity.

PYROLUSITE: The dendritic form of this mineral occurs at all quarries, on Feldspar and Beryl. If the material is shellacked, a fine specimen will result and the dendrites will not rub off.

QUARTZ: This material is by far the basic constituent of the dumps. Three varieties occur at the quarries, Smoky, Rose, and Milky Quartz, all of which may be secured by picking them off the quarry floor. Smoky Quartz, noted in fine, large crystals in the past, is not so readily available in the crystalline form today. Small crystals, however, may be found in the dumps. Fine, jelly-like Rose Quartz is common.

TOURMALINE: This complex Boron silicate occurs in two different forms. The first and more abundant formation is found as small, lustrous, black, striated crystals, on the Quartz and Feldspar. The second type occurs as moderately large,

2" to 3", rough crystals, rarely with terminations. The small crystals are sometimes so minute that they are almost indistinguishable from Biotite flakes.

URANOPHANE: Found with Autunite, the Uranophane occurs as yellow, crumbulent masses in the pegmatite and Beryl pockets. On a recent visit, the author found a yellow, extremely powdery mineral which he thought to be Uranophane, the oxide of Uranium, which upon chemical testing, was determined to be PHOSPHURANYLITE, the phosphate. This mineral, while not having been officially reported previously at Bedford, was undoubtedly, found there before, but probably misidentified for Uranophane.

GIGANTOLITE: This alteration product of Beryl is not difficult to locate and is an unusual mineral in most collections. The alteration occurs as a result of the loss of Beryllium. The amount of Beryllium which the Gigantolite contains determines the hardness.

Other minerals reported from Bedford are:

Graphite
Gummite
Hornblende
Pyrite
Pyroxene
Rutile
Titanite
Torbenite
Uraconite
Zircon

CONCLUSION:

Evident from this interesting and attractive tabulation of minerals is the popularity of the Bedford area. Although in operation for over sixty years these quarries still continue to offer collectors fine specimens, interesting stories and happy hunting grounds.

THE MONEY SPENT FOR THE
PURCHASE OF A GOOD SPECI-
MEN IS A GOOD INVESTMENT.

THE FAIRBURN AGATE

By G. H. SHERRILL

704-1st St., N.W., Watertown, S. D.

Located in the east-central part of Custer County, South Dakota, which is in the southwest corner of the State, we find the town of Fairburn. This little town is built on the east slope of the Black Hills on State Highway 79, approximately 30 miles south of Rapid City, S. D. Some 15 miles east, on the French Creek road, we come to what is known as the Fairburn agate beds.

French Creek runs through Fairburn on its way east where it joins up with the Cheyenne River. If we go west, which is upstream from Fairburn, we would come to the city of Custer, S. D., and also find that French Creek flows through this city on its way east. It was at this spot on French Creek, which is now Custer, that one of Gen. Custer's men discovered gold in the Black Hills when Custer was camped there with his soldiers. The story of gold in the Black Hills of South Dakota is very interesting but would require a volume of its own. So let us go back to the agate beds.

Perhaps we should have started out by saying—that once upon a time there was plenty of placer gold in upper French Creek as well as plenty of fine agates in the original Fairburn beds—for it is quite evident that both have been worked with great vigor and interest thus forming a scarcity in both places.

The beds have supplied a good many beautiful agates (sometimes several inches in diameter) with unique banding and coloring. The colors consisted of many combinations of red, yellow, brown white, pink and black, in fact most any color a collector would expect to find in an agate and termed by many as the fortification type. It seems only fair to say that the agates are beautiful and a collector might also add that they are not the most plentiful by far. While these agates take a nice polish, it seems they do not work as easily as the moss agate which is more uniform in its structure.

The beds consist chiefly of waterworn

pebbles or gravel composed of jasper, chalcedony carnelian, rose quartz, milky quartz, petrified wood, chert, agate, as well as other material, thus forming a wide variety of colors. This however does not add to the simplicity of finding an agate hiding somewhere in the midst of the pebbles.

"Veins" of gravel from several inches to several feet in thickness are exposed in certain localities. Sometimes they are found at the base of a pinnacle, sometimes well up on the steep side, but forming a uniform horizon. It is from these gravel "veins" that the agates have come. As the sun, wind, rain and frost unite in a battle of the elements, they deposit their victims at the bottoms of the slopes, thus forming a new bed of gravel in the open so that present-day collectors may enjoy themselves more freely. It would be interesting to know how long ago the agates left their original housekeeping quarters and how far they have traveled before being deposited in their present location.

The roads in this section of the country are not too plentiful and at their best are only gravel roads, nevertheless they are not too hard to travel during most of the time. Due to the fact that the old Fairburn agate beds were more or less easy to reach, made them very popular in the past and this of course brought on the scarcity of the agate.

A short distance beyond, to the east, we find the Cheyenne River which for some distance forms the border line between Custer and Washington Counties. This river also skirts the west edge of the South Dakota Badlands which cover thousands upon thousands of acres. These Badlands contain some very fine agate beds of the same type as found near Fairburn. Due to the fact that the beds are scattered over a wide area, many fine agates are still to be found in them. This is a poor country, however, for any one collecting agates for a commercial pur-

pose, as the agates are not concentrated enough.

Reaching the edge of the Badlands is not difficult; entering them is a different story and no place for a car.

Going north out of Fairburn, on highway 79, for approximately 11 miles, we find the town of Hermosa, S. D. Taking the Battle Creek road, which runs southeast and traveling some 30 miles, we come to the Cheyenne River, on the west edge of the Badlands. We cross the river via a bridge. From here on, however, it is not advisable for a stranger to go on alone and especially in a car. He should have a local guide with him.

We have made several trips, using horses in each case which we obtained nearby. And we always took along drinking water and food as a journey was no 30 or 40 minute trip. Once in the Badlands, as far as the eye can see, there are peaks and pinnacles (due to erosion) with their grand colored bands of red, cream, white, and lavender. But the ground when wet is anything but a pleasure to walk on. Fall is the preferable time to go, as the heavy rains are not so plentiful and the weather is cooler, making traveling more desirable.

The South Dakota Badlands, part of which has been set aside as a National Monument, have been visited and explored by scientists from all over the world. Here are found many different kinds of fossils. Also in one locality are found the popular and very interesting calcite sand crystals. Another locality has produced some very fine and beautiful geodes containing pale amethyst crystals. While the country is large and rough, some very interesting trips can be taken providing some one in the party is familiar with the region. Trying to direct a stranger there is rather a difficulty as roads are not plentiful and the scenery most deceiving. Speaking of plentiful, let us keep in mind that the agates are not as plentiful as some people have seen in their dreams. They often require patience and time for a full appreciation of them. To say that these agates are free from flaws and checks would be pure

folly. For like so many agates, they do have checks at times, nevertheless many of them are fine and beautiful. From the fact that the Badlands cover a large territory and are not easily overrun, makes it seem likely that agates will be found there for years to come.

During World War II, the U. S. Army used a large part of the Badlands as a bombing range. Anyone visiting this area who should happen to stumble upon a bomb that had failed to detonate, should by all means leave it alone. There are no agates in the area as large as a bomb, so a collector should have no trouble in telling one from the other.

It seems within the bounds of reason that the very nature of this vast domain will hold the great part of it in its present and natural state for a long time to come, as far as man is concerned. It also seems that many collectors are always wishing that agate beds as well as mineral deposits were located just off a well surfaced highway. We might suspect that nature and man are working with two different objectives. So let us be thankful that nature stubbornly hangs on to a lot of her fine mineral specimens making us seek them out skilfully rather than find them lined up on the shoulder line of a highway.

We Take Care of Our Friends!

Editor R & M:

No Rockhound wants to miss a single issue of *Rocks and Minerals*, and I felt rather dismayed about the fact that I had not renewed in time to get the July issue. Imagine my surprise and elation when, today, I received the July issue, despite the fact that I was not clearly entitled to it! Thank you very much for your thoughtfulness in sending this issue along; it is such things that make all Rockhounds feel that they are members of the same fraternity.

David A. Rauh,
Angelica, N. Y.

July 29, 1948

Federation Meeting at Denver A Great Success

Sacramento, California, will be the meeting place of the 1949 convention of the American Federation of Mineralogical Societies. The decision was voted unanimously at the first national convention, held June 13 to 16, 1948, in the Shirley-Savoy Hotel, Denver, Colorado.

Richard M. Pearl (Colorado Springs), convention chairman, was elected president. Jack G. Streeter (Tujunga, California) was elected vice-president and 1949 convention chairman. Don Major (Tenino, Washington), Chester R. Howard (Denver), and Ben Hur Wilson (Joliet, Illinois) were elected secretary, treasurer, and historian, respectively.

Registrants from 45 states were present at the convention. In addition to a fairly even division of attendance between the three existing regional federations, representatives were also present from the eastern mineral societies which are organizing a federation on the Atlantic coast.

The convention was sponsored jointly by the national federation, the Rocky Mountain Federation of Mineral Societies, and the Colorado Mineral Society, which was host. It was an unqualified success from start to finish. The exhibits were many and very attractive, the programs were intensely interesting, while the collectors in attendance numbered in the thousands.

Each of the five divisions of the federation had one or two full programs of talks by prominent speakers from all parts of the country. Dealers were present from 19 states. Twenty-four societies from 13 states had non-commercial exhibits.

The four-day convention closed with four field trips to different parts of Colorado, each trip ending beyond the borders of the state.

The convention gave many collectors a fine opportunity to acquire choice specimens. The greatest benefit, however, was the opportunity to form friendships and acquaintances with collectors from all over the country, having a common interest in minerals.

Two Piedmontite Localities in Massachusetts

The first locality was found by Mr. Rudolph Bartsch of Brookline, Mass., a few years ago at a new real estate development in Newton Upper Falls near the Boston-Newton boundary. There the Piedmontite is found in a local eruptive rock as finely granular blotches of a reddish color. A few small red crystals, 2-3 mm long, were found in a light colored matrix. Associated minerals noted were Calcite, Barite, Quartz and white Talc. The locality is accessible and further blasting might uncover a more extensive area.

The second locality was found by Mr. Gunnar Bjareby, of Boston, last summer in the last worked quarry in an extensive group of granite workings in Westford, Mass. Here the Piedmontite was found in well developed crystals about 3 mm long. The color is a pale orange-red. The entire mass occurred in a small vug in the granite and was recovered in a few micromounts. The brilliant crystals had been engulfed by Calcite. In the same quarry a bluish grey feldspar was noted as phenocrysts also small crystals of Albite and Epidote covering fault planes in the granite.

Gunnar Bjareby
147 Worthington St.,
Boston 15, Mass.

DECORATIVE MARBLES

(Continued from page 709)

stand it, he bought these marbles from dealers, collectors and the sellers of souvenirs at the ruins, a trade which flourished during the tourist season. From some Morton Correspondence, which came with the collection, vendors sold excavated wares to tourists, and any one who would pay them a few cents for a stone, received the history of the article being sold. Something like local citizenry near mines and quarries, who try to sell specimens to any one who might have a hammer.

THE AMATEUR LAPIDARY

ADDING COLOR TO STONES

By LUCILLE SANGER

Box 133, Green Mountain Falls, Colorado

A few years ago Mr. Leland Quick gave some recipes for adding color to stones. We have not had much time to experiment with them but those recipes we tried were very interesting. Being limited as to time we chose the simplest ones.

Those who have seen commercially dyed stones know that the color is usually very deep and of a uniform dark shade which renders the stone virtually opaque. We have never admired the commercial colors achieved, with perhaps the exception of black, and we have admired a great deal less the practice of selling these stones with a trade name which leads the buyer to believe that it is a different stone than it is, and that it is a stone of natural color. One of the most common deceptions, with the exception of "onyx", is "chrysoprase," a clear agate colored to a dark even green. It has little resemblance to the color of genuine chrysoprase, and while the colored agate and the chrysoprase are both silica stones, the texture differs greatly.

There is no natural black onyx, and the stones sold as such are not even onyx but are colored agate and, lately, black jade. Onyx is a carbonate and not a silicate.

The dyed stones are much more attractive if they are only tinted as they then look less like glass and more like themselves. A tint improves many a clear stone. The amateur cutter should not allow himself to be influenced by those who look down their noses at the practice of coloring stones—it is a fascinating branch of the hobby. The crime in dyeing stones lies in selling them for something else. Some folks, possessed of more prudery than sense, think nothing should be done to nature's handiwork, a stone. If this

argument were followed to its logical conclusion there would be no rock cutters, as cutting and polishing is adding to what nature has already done.

Due to the fact that heating is included in many of the methods of adding color to stones, it is better in all cases to cut and polish the stones first. The heating makes the stone brittle and there is danger of chipping and breaking in cutting a slab which has been heated.

One of the most attractive stones is the clear chalcedony such as is found in the Montana agates. It ranges from a water clear type through a rich deep honey color. Many of these stones, when held to the light, show a pattern which resembles hammering in metal. This pattern can be seen only when the stone is held up to the light. However, the addition of a little color will bring this hammered pattern to the surface thus making a very attractive cabochon.

The simplest recipe given by Mr. Quick is one which produces anything from a pale yellow tint to a deep butter yellow. The preparation is made as follows:

Make a saturate solution of potassium bichromate by covering the chemical with water and letting it dissolve. It should be made in a mason jar with a lid or a glass dish with a lid. The solution is a very vivid red. Lay the polished cabochons carefully in the solution and leave them there anywhere from two days to two weeks depending upon the depth of color desired. They can be taken out with tongs at intervals for inspection.

When the color is of sufficient depth, remove the stones from the solution and wash them thoroughly and dry. They are now ready for mounting and the color is permanent.

NATIONAL ASSOCIATION OF MINERAL DEALERS

First Meeting of Committee

This is a preliminary report of the first meeting of the committee formed to draft plans for the organization of a mineral dealers association.

This meeting was held in Denver, June 15, 1948, and was attended by all the members of the committee. The committee elected as its chairman, Dr. D. L. Gamble of Ward's Natural Science Establishment, Rochester, New York. In addition to Dr. Gamble the committee is composed of the following people:

Mr. V. D. Hill, of V. D. Hill Minerals, Salem, Oregon.

Mr. L. R. Gordon of Gordon Gem & Mineral Supply Co., 1850 E. Pacific Coast Highway, Long Beach 4, Calif.

Mr. C. K. Worthen, of the Michigan Lapidary and Research Co., Birmingham, Michigan.

Col. Fain White King, of Fain White King Minerals, Cairo, Illinois.

Mr. Raymond Schortmann, of Schortmann's Minerals, 6 McKinley Ave., Easthampton, Massachusetts.

Mr. Thomas S. Warren, of Ultra-Violet Products, Inc. 5205 Santa Monica Blvd., Los Angeles 27, Calif.

The committee tentatively adopted the name, "National Association of Mineral Dealers" and tentatively formulated the main objects of the organization, as follows:

1. To raise the ethical and professional standards of the trade.
2. To educate the collectors to the differences between good and poor specimens by every possible publicity medium.

These objects were discussed in considerable detail by the Committee with many suggestions from members as to the details. However, the final formulation of the details under each main heading will be worked out by the committee during the coming year.

The committee is seeking the cooperation of the Federal Trade Commission in the formulation of rules, and also invites

and requests suggestions from dealers throughout the country concerning the formation of the association. These ideas and suggestions should be forwarded to the Committee Chairman, Dr. D. L. Gamble at Ward's Natural Science Establishment, P. O. Box 24, Beechwood Sta., Rochester 9, New York. Also if possible the dealers in various parts of the country should contact the members of the committee who happen to be well distributed geographically across the country.

Thomas S. Warren, President
Ultra-Violet Products, Inc.

Large Kidney Ore Found in Michigan

Ironwood, a little city in the northwestern corner of Michigan, is famous for the many interesting minerals found in its iron mines. A recent find, made by Lawrence Eddy, President of the Range Mineral Club, was a large kidney ore (the largest we ever heard of). Kidney ore is a kidney-shaped variety of hematite. A letter from Mr. Eddy to the Editor of *Rocks and Minerals* reads as follows:

"I wish you could see the chunk of kidney ore I lugged out of the mine here where I work. It was found between the 30th and 31st level of the Geneva-Davis Mine. It weighs 65 lbs. It has been a long time since we have found any of this type of ore.

"The Geneva-Davis is a hematite mine located about 3 miles east of the downtown district of Ironwood. The deepest level of the mine is the 32nd, which is around 3200 feet below the surface; the mine underground covers an area of around 1 sq. mile. I have worked underground in this mine for over 13 years.

"Besides kidney ore, we have found manganite, quartz crystals, and acicular hematite in this mine."

Lawrence Eddy
200 Norrie St.,
Ironwood, Mich.

June 9, 1948

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the Nov. issue, they must reach us by Oct. 10th—the Editor.

Pacific Mineral Society

Sound films on "Oil for Aladdin's Lamp" by courtesy of the Shell Oil Company and "Chemistry of Aluminum" by courtesy of The Aluminum Company of America were shown to the Pacific Mineral Society by Mr. and Mrs. Currie, at the June 11, 1948, meeting.

Aluminum makes up 8 percent of the earth's crust but has been one of the most difficult ores to process. It is never found in veins or as nuggets, but is mined as Bauxite, which is of secondary origin. According to Dana, it has commonly been formed under tropical climatic conditions by prolonged weathering of aluminum-bearing rocks or derived from the weathering of clay-bearing limestones. Aluminum was not isolated until 1846, and then not profitably until the year of 1886, when Charles Martin Hall made the remarkable discovery how it could be segregated and processed commercially. The films showed the processing of Bauxite to remove the impurities and from there to the mills where it showed the use of Alloys and heat treatments. Some of it was made into ingots and then taken through the rolling mill which consisted of a series of rollers and as the aluminum ingots passed through these, they were reduced in thickness and at the end came out in sheets which were more than a city block in length. Aluminum is used in many forms such as structural bars, power wire, screens, sheets for cooking utensils, railroad cars, airplanes, and buildings. Aluminum must be processed according to the articles which are to be made, such as; hydraulic extrusion for dyes, impact extrusion for tubes, forging and casting.

According to sound film No. 2, which was "Oil for Aladdin's Lamp," Kerosene was the first known oil to be extracted from the earth and dates back to the year of 1859, when it was used to replace the whale oil for the lamps. In this modern day, oil is everywhere around us in the form of plastics, alcohol, artificial leather, fertilizers, paints, fumigants, shampoos, ink, pectin, weed killers, and numerous other items. One of the most interesting experiments shown in the film, was the making of synthetic rubber from oil by shifting and rearranging its molecular structure. One chemical, called D-D, has proved particularly deadly to insects. Produced by fractionating natural gas, it rid Hawaii's pineapple fields of nematode. They have a dry method which consists of tubes behind the blades of a tractor drawn harrow and these tubes direct the chemicals (Ammonia and D-D) into the ground eight inches below the surface. The

wet method consists of piping Ammonia, which supplies life-giving nitrogen, into the crop irrigation system.

The Pacific Society's field trip for May was to the Good Springs Quadrangle in Nevada, where they obtained Hydrozincite, Smithsonite, Feldspar Crystals, Galena and many other minerals characteristic of this area.

Mrs. A. E. Allard, Pub. Chmn.
3133 Live Oak St.,
Huntington Park, Calif.

Gem Village Rock Show

Our fourth annual Rock Show was held in the Shipley Exhibit Hall, Gem Village, Bayfield, Colo., June 19th and 20th, 1948. Gem Village exhibitors, members of the Four Corner Rock Club of Durango, and a number of other exhibitors, among them The Junior Mineral Exchange and The Earth Science Digest of Revere, Massachusetts, participated.

A caravan of cars, which made up the "South-bound" field party from Denver, arrived at the Village the evening of the 18th. The group was entertained at the Colorado Gem Company with Mr. Neuenschwander's color pictures.

There were tours in the morning and afternoon of both days into Village homes to see the residential collections.

Mr. Jerome M. Eisenberg, Editor of *The Earth Science Digest*, spent four days visiting Gem Village. Mr. Eisenberg seemed quite enthusiastic over the future out-look for the Village.

L. M. Shipley,
Correspondent
P. O. Box 232
Bayfield, Colorado

Range Mineral Club

A new mineral club has recently been organized in the iron mining region of Ironwood, Mich. The new club is called the Range Mineral Club and it has a membership of 20. The officers are Lawrence Eddy, President; Mrs. Andrew Laskovich, Vice-President; Miss Georgia Peterson, Secretary and Treasurer; Messrs. Peter Peterick and Andrew Laskovich, Field Trip Directors.

One field trip has been held so far to the gravel pits at Carlton, Minn., where agates were found.

Mr. Eddy, a well known mineral collector of the iron country of Michigan, is a member of the R.&M.A. His address is 200 Norrie St., Ironwood, Mich.

Connecticut Valley Mineral Club

Fifteen members of the club met at Mr. C. M. Van der Veer's beautiful home in Amsterdam, N. Y., Sunday July 11th, 1948.

The group assembled from Brattleboro, Vermont—East Hampton, Springfield, Ware and Belchertown, Massachusetts, also Colebrook, Connecticut, a distance of 130 miles.

The day was ideal and Mr. and Mrs. Van der Veer and their dear little granddaughter's welcome was most cordial.

After looking over Mr. Van der Veer's beautiful collection of Herkimer County "diamonds"—which I understand ranks amongst the finest in our country—we were shown a beautiful collection of cameos.

His large old house was filled with the most beautiful antiques, many handed down in the Van der Veer family as they were among the first settlers of Amsterdam, N. Y., and this house is one of the original homes.

Before we left for our hunting expedition, he put out several large trays of Herkimer Co. "diamonds" and said for us to take what we wanted. You can just imagine we went at them like vultures—but like all true Connecticut Valley collectors, I overheard a number of times, "—Jack, here's a good one—" or "—Norman, here's a good one for your cutting—". At 11:30 we started for the collecting field and what a find!! Sitting right on top of the soil sparkling like diamonds were these beautiful rock crystals.

Nobody wanted to take time for lunch.—When our lunches were eaten I have no idea but it wasn't long before each one had a spot and was digging.

After a happy day we started home very reluctantly, around 4:00 p.m., with our pockets filled with many, many loose stones and a great many specimens in the matrix, dolomite, carbon, calcite and Herkimer County "diamonds" and a real filled heart of satisfaction.

We are truly grateful to our president, Mr. John Kitson, for arranging with his old friend, Mr. Van der Veer, such a remunerative and happy day.

Mabel A. Newell
Colebrook, Conn.

Feather River Gem & Mineral Society

The Society now has a permanent address, P. O. Box 1508, Oroville, Calif. Mrs. Alma Hodge has been appointed our Director of Public Relations, and during the summer months, while our meetings are suspended, she will work in cooperation with the secretary of the Chamber of Commerce to direct rockhound visitors to those in this vicinity with similar interests. She is located at 685 Pomona Ave., Oroville.

Over the Memorial Day week-end, the Feather River Society, represented by two families, the Cloughs and the Rankins, made a very successful trip into the Lake Lahontan

area of northwestern Nevada.

At the June 10 meeting, Lee Reeves showed colored slides of minerals, in natural and fluorescent colors, and it was agreed that the Thompson Studio slides were the best of those shown.

On June 13 a family style pot-luck picnic, mineral show, and prize drawing was held at Bidwell Bar Park. It was attended by more than 35 people, including the presidents of our own society, the Cherokee Gem & Mineral Club, and the Golden Empire Mineral Society of Chico.

At the June 24 meeting, a new treasurer was elected, Douglas Ward; and we found the treasury in a much healthier state than we had expected. This is the last meeting until October 14.

Adeline Rankin
Secretary for Feather River
Gem & Mineral Society

Southwest Mineralogists

The Southwest Mineralogists Inc., at their June 28, 1948, meeting, were happy to welcome home Mr. John Ackers. Mr. Ackers, the founder of the Society, has been residing in Lima, Peru, for the past four years in connection with the Goodyear Rubber Company.

Mr. Ackers gave an informal talk on Peru, concerning the climate, customs, and minerals. He told us most minerals are hard for the average rockhound to collect because of the jungle and mountains. He also showed some beautiful color slides of the country and the most interesting Aztec ruins.

The evening ended with an old fashion ice cream supper.

Connie Trombatore
Corr. Sec'y
338 Pomelo St.
Monterey Park
California

Texas Mineral Society

At the July meeting of the Texas Mineral Society in the Baker Hotel in Dallas, a round table discussion of the rock trips of various members was held. Mr. J. D. Churchill told of his hunts in Arizona and New Mexico; Mr. Wm. H. LaDew had been to the Denver Convention and various localities in Colorado; Dr. Vernon Bryan told of his trip to Utah.

A Program Committee consisting of Mr. and Mrs. R. C. McIver and Mr. T. D. Copeland was appointed by President LaDew.

Plans were made for a Dinner at the Baker Hotel in the near future.

Ralph D. Churchill
Sec'y-Tres.
2003 Republic Bank Bldg.
Dallas 1, Texas

Cincinnati Mineral Society

A regular monthly meeting was held 8:00 p.m., Wed. June 30, 1948, at the Cincinnati Museum of Natural History, Cincinnati, Ohio. Despite prevailing high temperature, the meeting was attended by 18 members.

Printed forms were presented to the members by the committee on cataloging Cincinnati collecting areas. Forms were presented for approval and criticism and will be distributed to all members for use at the July meeting.

The field trip committee reported that since most members were committed to previous appointments in June, the field trip was postponed. A tentative date of July 18 was selected.

Mr. Sarles reported briefly on a trip taken by himself and some others to the Elliott County, Kentucky, peridotite area which is best known for the occurrence of kimberlite. We plan at some time to write a complete article on our investigations in this area.

The program committee announced a program converging meetings thru November, in which our members will be the principal speakers.

Mr. Frank Atkins reported briefly on the condition of our treasury and also announced a small assessment to cover membership in the museum association.

The speaker of the evening, our Mr. Ralph Clark, was introduced by Mr. James Clements.

Mr. Clark gave an excellent report on a trip to Iceland which he made some years ago. He gave us many very interesting facts and sidelights on native life in the island. Much to his disappointment and ours, too, he was unable to collect any Iceland spar as this material was mined and sold under control of the Icelandic government. The only material that he collected, besides basaltic rocks, was some geyserite (variety of opal) which occurs in quantity at the hundreds of hot springs that dot most of Iceland.

The balance of the meeting was devoted to a question and answer period on the talk, followed by a general discussion.

Charles L. Gschwind
Corresponding Secretary
6931 Diana Drive,
Cincinnati 24, Ohio

The Georgia Mineral Society

(Atlanta, Georgia)
July, 1948 Meeting

For the second time the Society enjoyed the hospitality of Ken Lewis, Curator of Fernbank, and a picnic supper was held on the verandah of the 80 year old mansion now a children's museum.

After the picnic the members gathered in the projection room where a short meeting was held. Two new honorary life members were unanimously elected after a reading of the citations by Dr. Mitchell. Mr. Richard W. Smith and Dr. Craig Arnold will be notified of their election by President Furcron.

When the business part of the meeting was over, Charles Webb, one of our new junior members, showed a short reel of 8 mm color films on the field trip to Graves Mountain in April, after which Ken Lewis showed us a reel on the manufacture of watch and chronometer bearings of synthetic sapphire, and also one on the mining of diamonds in So. Africa.

A new portable Mineralight was exhibited by Dr. Furcron who invited the members to go outside in the driveway and parking area to see if any fluorescent material was present. Most of us did not realize that several spots had been salted until afterwards, however there were a good many finds of beautiful material that had not been planted, now it is up to someone to identify this material.

S. C. Knox
Corresponding Secretary
2142 Memorial Dr., S. E.
Atlanta, Ga.

BIBLIOGRAPHICAL NOTES

Gems from Keweenaw Beaches: by Henry L. Luoma.

The Keweenaw Peninsula of northwestern Michigan is famous the world over for its many interesting minerals, most of which come from the copper mines of the area. The beaches along Lake Superior produce minerals also, chiefly agate, which are found as water-worn pebbles. These pebbles, when polished, often make beautiful gems.

Gems from Keweenaw Beaches is a small booklet whose author is Michigan's most famous

mineral dealer who operates an establishment under the name of Keweenaw Agate Shop, Ahmeek, Mich. The booklet is a most attractive publication with a number of interesting illustrations. It gives briefly one scientific theory as to how Keweenaw gem agates were formed, what causes the contrasting banding and certain of the "eyes", how to collect and where to find them. It is 4½ x 6½ inches in size and contains 12 pages.

Published by Henry L. Luoma (Keweenaw Agate Shop), 28 Vivian St., Ahmeek, Mich.

The Rocks and Minerals Association

(Members All Over the World)

President, Oscar W. Bodelsen
219 E. Main St.
Mt. Kisco, N. Y.

Director of Tours, Richmond E. Myers
Dept. of Geology,
Muhlenberg College, Allentown, Penn.

Vice-President, Ronald L. Ives
Univ. of Indiana, Bloomington, Ind.

Secretary-Treasurer, Peter Zodac
Box 29, Peekskill, N. Y.

Organized in 1928 for the increase and dissemination of mineralogic knowledge

To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

Those of our readers who are members of the Association can rightly feel that they too were sponsors of these many achievements that have helped to give mineralogy a national recognition. Among your friends there must be many who would like to have a part in the Association's work—to share with you the personal satisfaction, the pleasure, and the benefits of membership. Will you give your friends this opportunity to join the Association by nominating them for membership?

Each new member helps to extend the Association's activities—helps to make your magazine larger, better, and more interesting, and above all assists in the dissemination of mineralogical knowledge.

Some advantages of membership:

All members in good standing receive:

(1) **Rocks and Minerals**, a monthly magazine. (2) A member's identification card that secures the privileges of many mines, quarries, clubs, societies, museums, libraries. (3) The right to participate in outings and meetings arranged by the Association. (4) The right to display a certificate of membership and to place after their names a designation indicating their membership or to advertise membership on stationery, etc. (5) The distinction and the endorsement which comes from membership in the world's largest mineralogical society.

Mineralogical clubs which subscribe for **Rocks and Minerals** also become affiliated members of the Rocks and Minerals Association and enjoy all the advantages which such an affiliation affords.

A number of clubs hold membership in the Association, participate in the annual outings, and co-operate in many ways in furthering the aims and ambitions of the Association.

Affiliation with the world's largest mineralogical society cannot fail to increase membership, enlarge circles of acquaintanceship, and stimulate a keener interest in mineralogy.

THE MICRO MOUNTER

Conducted by Leo N. Yedlin, 557 W. Penn St., Long Beach, N. Y.

(Copy for this column arrived too late to be inserted in this issue and so it will be held over for the September number).

FIRST EXHIBITION OF FOSSILS FROM UNIVERSITY OF CHICAGO

The amphibians of today—the well-known frogs, toads and salamanders, and the unfamiliar caecilians—convey almost no idea of what this animal group was like in its hey-day, some 230 million years ago, according to Bryan Patterson, curator of fossil mammals at Chicago Natural History Museum.

Fossil specimens, one of them 6½ feet long, of some of the early relatives of today's little amphibians and a number of skeletons of some of the earliest reptiles, have just been added to the paleontological exhibits at the museum. About sixteen different species are included, some of them the giants of their times.

These are the first additions to be made to the museum's public exhibits from the large fossil vertebrate collection recently received as a gift from The University of Chicago.

"From the later Devonian period (320 million years ago) to well into the Pennsylvanian period (240 million years ago) the amphibians were the dominant, and indeed for most of the time the only land vertebrates," Mr. Patterson says. "A great number of diverse forms arose, the largest of which attained the size of crocodiles.

"The ancestors of these creatures were some lobe-finned fish that came out of the water about 300 million years ago. The manner of their coming is not known but the event was one of the most momentous in the long history of life on earth, for it was destined to lead, among other things, to the rise of the dinosaurs and their eventual replacement by the mammals, to the appearance of man and the development of his civilizations, to total wars and the release of atomic

energy."

Among the specimens just added to the exhibits are: the large and ungainly Eryops, and the smaller but even more clumsy-looking Cacops, and Trematops, representing the amphibians; and of reptiles the primitive Labidosaurus; the small Captorhinus; a creature called Aulaccephalodon; the lumbering pareiasaurs, and the pelycosaurs Dimetrodon and Edaphosaurus, which had sail-like long dorsal spine on the trunk vertebrae that were joined together in life by skin.

"Among the early reptiles and amphibians, the larger ate the smaller, the smaller the smallest, and the smallest in turn subsisted on insects and other invertebrates," Mr. Patterson says. "Presumably some of these graduates from the fish world also lived by eating their relatives which had remained as fish in the fresh waters. In the reptiles of the Edaphosaurus group we have, perhaps, the first direct tapping by the backboned animals of the food supply afforded by the plant world."

The collection is mainly from Texas and South Africa. Further specimens will be added to the exhibits as they are prepared.

RELIGION AND THE MINERALOGIST

(Continued from page 708)

their work was realized by others. Is it possible that their discoveries were a matter of luck? No. They were far ahead of their times and their eyes were opened to the truth by God that mankind might have the benefits of new and greater knowledge, and through that knowledge, build for himself a better world.

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